

3.4 MARINE WILDLIFE (MARINE MAMMALS, SEA TURTLES, SEABIRDS)

Marine wildlife resources reported at or near the project site, defined for this analysis as an area encompassing the 4H shell mounds, include 42 species of marine mammals, four species of sea turtles and some 195 species of birds. A number of these species are listed as threatened or endangered, while many others are considered protected or listed as California Species of Special Concern. The Program Alternatives include the removal of the Hazel caissons with explosives, which pose significant risks for marine mammals, sea turtles and diving seabirds because of the air spaces in their bodies. Also, several Program Alternatives include disturbing the shell mound sediments, either to remove them or to spread them. These sediments are known to contain substances that may be toxic to marine wildlife. Since marine mammals and seabirds feed at high trophic levels, the release and potential bioaccumulation (see Section 3.2) of these substances is a matter of concern. Finally, general program operations also pose some risks to marine life. This section describes the environmental setting, discusses the marine life of the area with emphasis on threatened and endangered species, reviews the regulatory setting, assesses the potential impacts of each Program Alternative, and recommends measures to mitigate significant adverse impacts.

3.4.1 Environmental Setting

The bathymetry at and near the project site is not particularly attractive to most species of marine mammals and sea turtles found in the Southern California Bight (SCB). The only prominent bathymetric features near the project area are the Carpinteria Reef, southwest of Sand Point and inshore of the project site about 1.5 nautical miles (nm), and two moderately elevated rock outcrops about 0.9 nm toward shore from the project site and west of the reef (National Ocean Service [NOS] 1998; Figure 3.4-1). Aside from these features, the bottom consists of a broad, gradually sloping sedimentary plain.

By contrast, other parts of the Santa Barbara Channel show considerable diversity of habitats, from the Twelve-mile Reef south of Santa Barbara, which rises to within approximately 100 meters of the surface from a seaward depth of approximately 400 meters, to the steep escarpments along the north shores of the four northern Channel Islands, as well as numerous offshore rocks, shoals and islets (NOS 1999). The prevailing northwesterly winds in the southern and western part of the channel, coupled with the steep escarpments, produce vigorous upwelling. This fosters tremendous food production, which in turn attracts marine mammals. Not surprisingly, the greatest abundance and diversity of marine mammals are found off the Channel Islands, not off the mainland coast.

The limited species diversity observed during extensive surveys conducted for the Chevron 4H Decommissioning Project (4H Project) and a Chevron proprietary study reflects that the project area is not preferred habitat for most species. Of the 42 species of marine mammals reported or expected to occur in the SCB, only six species were observed during the 4H Project and 10 during the proprietary studies. Of the four

species of sea turtles known for the SCB, none was reported during the 4H Project, nor were any reported for other projects in the region (Howorth 1996; 1997a and b; 1998a, b, and c).

3.4.1.1 Marine Mammals

Taxa in or Near the Project Area

Marine mammals discussed in this document represent three orders. The order *Cetacea* includes whales, dolphins and porpoises; the order *Pinnipedia* includes seals and sea lions; and the order *Carnivora* includes only one representative, the southern sea otter (*Enhydra lutris nereis*), a member of the weasel family (*Mustelidae*). Cetaceans spend their entire lives at sea. Pinnipeds haul out to rest, bear their young and breed; these haul-out areas include sites on the northern Channel Islands and, in the case of Pacific harbor seals (*Phoca vitulina richardsi*) and to a much lesser extent, California sea lions (*Zalophus californianus c.*), along the adjacent mainland coast. These sites are discussed in detail in the species accounts that follow in this section. The southern sea otter is rare near the project area and seldom hauls out in California (Vandevere 1972; Faurot 1985), although sea otters in Alaska haul out regularly.

Species Seasonality

Knowing the seasonality of marine mammal occurrences is important in analyzing potential impacts. While some species occur in the region year-round, others are transients, either migrating through these waters, following movements of prey or appearing with masses of warm or cold water which may or may not coincide with the seasons. Although some researchers indicate the seasonality of marine mammal occurrences by calendar seasons, such as spring or winter (U.S. Navy 2002), others prefer to use "oceanographic seasons," which consist of the cold-water months from November through April and the warm-water months of May through October (Carretta et al. 2000). The intrusion of unusually warm or cold water masses, however, such as El Niño or La Niña, complicates these categorizations. Some species, like California gray whales (*Eschrichtius robustus*), are present at about the same times every year regardless of water temperatures. Others, like northern right whale dolphins (*Lissodelphis borealis*), are associated with cold water masses and do not appear when the water is warm. Thus, they usually show up in late winter or spring, when the water is coldest, unless a strong El Niño event is taking place. Still other species are only associated with warm water. The species accounts which follow later in this section describe the occurrence of marine mammals in several ways because no one method accurately categorizes seasonal distribution.

Species Observed during 4H Project

The relative abundance and distribution of marine mammals during the 4H Project were documented through detailed, site-specific surveys that were conducted as part of the mitigation effort during the severing of the platform legs using explosives. This phase of the project occurred from July 12 through 18, 1996. The area was surveyed using line

transect methods similar to those employed by the regulatory agencies in their wildlife surveys. Both aerial and shipboard surveys were conducted. The aircraft and boats were the same used by the regulatory agencies in some of their surveys (Howorth 1996).

The aerial surveys consisted of flying along lines that extended 4 miles to either side of the platforms. Each line was a half-mile apart. Lines were flown from shore out to 4 miles beyond the outermost platform. The shipboard lines consisted of the same type of pattern, only the lines were a 0.25 mile apart and only 1.5 miles past each platform, for a total of 3 miles each line. In addition, a helicopter and other boats surveyed the 3,000-foot (2,727-meter) hazard zone around each demolition site. The following species were observed during the 4H Project:

| | |
|--|------------------------|
| • Humpback whale (<i>Megaptera novaeangliae</i>) | 2 animals |
| • Minke whale (<i>Balaenoptera acutorostrata</i>) | 3 animals |
| • Unidentified rorqual (probably minke whale) | 1 animal |
| • Long-beaked common dolphin (<i>Delphinus capensis</i>) | 879 animals (2 groups) |
| • Coastal bottlenose dolphin (<i>Tursiops truncatus</i>) | 18 animals |
| • California sea lion (<i>Zalophus californianus c.</i>) | 753 animals |
| • Pacific harbor seal (<i>Phoca vitulina richardsi</i>) | 25 animals |

Only two species of marine mammals (California sea lion and Pacific harbor seal) were observed in or near the 3,000-foot (2,727-meter) hazard zone established to protect marine mammals from the effects of the detonations. The humpback whale observed near Platform Hope (see Figure 3.4-5) was reported several hours before demolition activities began on Platform Hilda, over 5 nm away. No injuries or mortalities involving any marine mammals occurred during the 4H Project (Howorth 1996).

Although only six species of marine mammals were observed during the project, a few others, such as the California gray whale, do occur in the immediate area, either seasonally or sporadically. Additional details are provided in the species accounts later in this section.

Marine Mammals Observed during Chevron Proprietary Marine Life Studies

Proprietary marine life studies were conducted for Chevron to provide information for the environmental planning and mitigation process for the potential decommissioning of five oil platforms off California: Gail and Grace, south of Ventura; Hermosa, Harvest and Hidalgo, southwest of Point Arguello (Howorth 1998b). The Marine Mammal Consulting Group, Inc. (MMCG), an independent firm based in Santa Barbara, California, conducted the studies, which began December 1, 1996 and were called off on February 11, 1998, when Chevron began planning for the sale, rather than the removal, of its offshore facilities. Meanwhile, considerable research had been conducted in areas surrounding the five platforms during this period.

The studies were perhaps the most extensive of their kind yet performed off the west coast. They were designed to fill site-specific gaps in the existing body of knowledge on marine mammal species diversity, seasonal abundance, migration and behavioral patterns, and other relevant factors. Data thus obtained were intended to be applied to the protection of wildlife during the decommissioning of the five platforms. In support of this Program EIR/EA, MMCG, as the CSLC's consultant, requested authorization from Chevron to use the data relevant to the shell mounds site, to which Chevron agreed (pers. comm., K.M. Light, Chevron, 2002).

The study consisted of two parts. One study area extended from Government Point to Pt. Purisima and to the west, offshore. This survey area encompassed Hermosa, Harvest and Hidalgo, the three northern platforms. This first part was not relevant to the shell mounds site because it did not cover the area. The second survey area, which included Platforms Gail and Grace as well as the shell mounds site, extended from Carpinteria, California, out to Chinese Harbor, on the northeast shore of Santa Cruz Island. The eastern boundary extended from just north of Port Hueneme, California, to a point east of Anacapa Island approximately 4 nm. The results from this second survey area were made available for this document.

The transect survey lines were 2 nm apart (Figures 3.4-2 and 3.4-3). A total of nearly 200 nm of survey lines, including the turning areas at the end of each line, were surveyed each time. The survey area encompassed some 325 square miles. The aircraft used during the surveys were fitted with observation domes on each side of the fuselage and an observation port in the belly. These aircraft were already approved and used by the regulatory agencies for their own surveys. The electronic navigation equipment was also the same. In addition to the pilot, the aircraft carried one data recorder, one observer on each side of the aircraft and a third observer in the plane's belly. This ensured complete overlapping coverage of the survey areas. This same arrangement of recorder and observers is still used by the agencies during their surveys.

A total of 42 surveys were flown over a 15-month period. Ten species were noted:

- Common dolphin (*Delphinus* spp.),
- Bottlenose dolphin (*Tursiops truncatus*), coastal stock,
- Risso's dolphin (*Grampus griseus*),
- Pacific white-sided dolphin (*Lagenorhynchus obliquidens*),
- California gray whale (*Eschrichtius robustus*),
- Blue whale (*Balaenoptera musculus*),
- Humpback whale (*Megaptera novaeangliae*),
- Minke whale (*Balaenoptera acutorostrata*),
- California sea lion (*Zalophus californianus* c.), and
- Pacific harbor seal (*Phoca vitulina richardsi*).

Of particular interest for the shell mounds project, only two blue and eight humpback whales were observed. No other federally listed species of marine mammals and sea turtles were seen despite the extensive survey effort. All of the sightings of endangered whales were from mid-channel to within approximately 5 nm of the islands. The closest sighting was nearly 14 nm from the nearest shell mound.

Far greater numbers of gray whales were observed during both the north- and southbound migrations in the other study area, between Point Conception and Purisima Point (Figure 3.4-4). This clearly indicates that the vast majority of gray whales favor routes along the Channel Islands rather than along the mainland coast, at least in the SCB. Similar findings were reported by Carretta et al. (2000), who noted that the majority of gray whales migrated past either San Clemente or Santa Catalina Islands rather than near the mainland coast.

Of the other sightings, all minke whales were seen 4 to 5 nm north of Santa Cruz and Anacapa Islands. All Risso's dolphins were observed from mid-channel over to the north shore of the islands. The vast majority of common dolphin sightings were in the same area. Only five Pacific white-sided dolphins were seen, all near Santa Cruz Island. Coastal bottlenose dolphins were seen from the breaker line to approximately 0.5 nm offshore. Harbor seals were seen throughout the area, with greatest densities near the islands and mainland coast. California sea lions were by far the most abundant species seen and occurred throughout the study area (Howorth 1998b).

The following sections describe in more detail the species of marine mammals that could occur in the project area.

Non-Listed Species of Cetaceans

All cetaceans are protected under the MMPA and its amendments. Otherwise, the species discussed in this section have no special protection status. Listed threatened and endangered species are discussed below under a separate heading. Non-listed species that are known or have some potential to occur at or near the project site are summarized in Table 3.4-1 and discussed in detail in the species accounts. The level of detail provided for regularly or occasionally occurring species is necessary because any take involving a marine mammal would be considered significant. Summaries are provided for species that have not been reported at or near the project site, but that are known from only a few sightings or strandings in the SCB, as well as for species that frequent deep offshore waters of the continental slope and deep ocean in the region.

Prey preferences are provided for species known to occur regularly in the region because some of the prey organisms are known to accumulate some of the types of potentially toxic substances present in the shell mounds. Potential impacts from such substances are discussed in Section 3.4.4.1.

**Table 3.4-1. Occurrence of Non-Listed Species of Cetaceans
in or near the Project Site**

| <i>Species</i> | <i>Population or Stock Size</i> | <i>Occurrence in SCB</i> | <i>Reported near Project Site</i> | <i>Potential Occurrence</i> |
|-----------------------------------|-------------------------------------|------------------------------|---|-----------------------------|
| Short-beaked common dolphin* | 373,573 | Abundant | No* | Likely |
| Long-beaked common dolphin* | 32,239 | Abundant | Yes | Likely |
| Bottlenose dolphin: coastal stock | 206 | Common; low numbers | Yes | Likely but inshore |
| Bottlenose dolphin offshore stock | 956 | Locally abundant | No | Extremely unlikely |
| Pacific white-sided dolphin | 25,825 | Sporadically abundant | Yes | Unlikely |
| Northern right whale dolphin | 13,705 | Sporadically abundant | No | Unlikely |
| Risso's dolphin | 16,483 | Locally abundant | Yes | Unlikely |
| Killer whale (both stocks) | 346 (transient); 285 (offshore) | Uncommon | Yes | Unlikely |
| Short-finned pilot whale | 970 | Uncommon | No | Extremely remote |
| False killer whale | Not available for SCB | Rare | No | Extremely remote |
| Spotted dolphin | Not available for SCB | Rare | No | Extremely remote |
| Striped dolphin | Not available for SCB | Rare | No | Extremely remote |
| Long-snouted spinner dolphin | Not available for SCB | Rare | No | Extremely remote |
| Rough-toothed dolphin | Not available for SCB | Rare | No | Extremely remote |
| Dall's porpoise | 117,545 | Sporadically abundant | Yes | Possible; cold water |
| Harbor porpoise | 932 | Rare | No | Remote |
| Baird's beaked whale | 379 | Rare | No | Extremely remote |
| Cuvier's beaked whale | 5,870 | Uncommon | No | Extremely remote |
| Hubb's beaked whale | 3,738 combined with others | Rare | No | Extremely remote |
| Blainville's beaked whale | 360 | Rare | No | Extremely remote |
| Ginkgo-toothed whale | 3,738 combined with others | Rare | No | Extremely remote |
| Perrin's beaked whale** | 3,738 combined with others | Rare | No | Extremely remote |

**Table 3.4-1. Occurrence of Non-Listed Species of Cetaceans
in or near the Project Site (continued)**

| <i>Species</i> | <i>Population or Stock Size</i> | <i>Occurrence in SCB</i> | <i>Reported near Project Site</i> | <i>Potential Occurrence</i> |
|--|-------------------------------------|------------------------------|---|-----------------------------|
| Stejneger's beaked whale | 3,738 combined with others | Rare | No | Extremely remote |
| Pygmy sperm whale | 4,746 | Rare | No | Extremely remote |
| Dwarf sperm whale | Not available | Rare | No | Extremely remote |
| California gray whale | 17,414 | Common seasonally | Yes | Likely in season |
| Minke whale | 631 | Uncommon | Yes | Likely; low numbers |
| Bryde's whale | 12 | Extremely rare | No | Extremely remote |
| <p>*The short- and long-beaked common dolphins were once considered a single species, thus earlier surveys may have reported this species near the site.</p> <p>**Formerly reported as Hector's beaked whale (<i>Mesoplodon hectori</i>)</p> <p>Sources: Carretta et al. 2001 and 2002; Rugh 2002.</p> | | | | |

1 SHORT-BEAKED COMMON DOLPHIN (*DELPHINUS DELPHIS*)

2 This species appears to be increasing in population, perhaps because of a general
3 warming trend in the ocean (Carretta et al. 2001). The short-beaked common dolphin is
4 the most abundant species of cetacean throughout the SCB, ranging up to 300 nm
5 offshore.

6 The common dolphin was once considered a single species. Recent research has
7 determined that a separate species, the long-beaked common dolphin (*Delphinus*
8 *capensis*), also exists (Heyning and Perrin 1994). (The long-beaked common dolphin is
9 discussed below.) As a result of this determination, only the most recent surveys
10 distinguish the two species (Carretta et al. 2001). Unfortunately, distinguishing between
11 the two species near the project site is not possible from earlier surveys.

12 The California, Oregon and Washington stock size is estimated at 373,573 (Carretta et
13 al. 2001). In the SCB, the short-beaked common dolphin is most prevalent from late fall
14 to spring, when waters farther north are coldest. In summer, the California, Oregon and
15 Washington stock of this species ranges as far north as 40 degrees north latitude
16 (Mangels and Gerrodette 1994; Forney and Barlow 1998), although it has been reported
17 as far north as 42 degrees, or just north of Eureka, California. Its southernmost
18 distribution is at about 13 degrees north latitude, off Central America.

19 The short-beaked common dolphin is generally associated with tropical to warm
20 temperate water, which is why it reaches northern California during summer and early
21 fall. The short-beaked common dolphin mainly feeds on market squid (*Loligo*
22 *opalescens*) and Pacific hake (*Merluccius productus*). It also occasionally feeds on
23 northern anchovy (*Engraulis mordax*). The presence of short-beaked common dolphins
24 at or near the project site is possible, particularly when anchovies are present, but the

greatest numbers of these dolphins generally occur offshore, along island escarpments and other areas of high relief, where northern anchovies tend to be more concentrated.

LONG-BEAKED COMMON DOLPHIN (*DELPHINUS CAPENSIS*)

The long-beaked common dolphin also appears to be increasing in population, perhaps because of a general warming trend in the ocean (Carretta et al. 2002). The long-beaked common dolphin appears to be most concentrated around the northern Channel Islands (Carretta et al. 2002). It is quite possible that this species has been under-reported because, in the field, it is not easy to distinguish from the short-beaked common dolphin. The California stock of this species is estimated at 32,239 animals (Carretta et al. 2002). Like the short-beaked common dolphin, the long-beaked favors tropical to warm temperate water, thus its seasonal movements are similar. The long-beaked dolphin favors small schooling fish and squid as prey.

Considering that this species was only recently recognized as distinct from the short-beaked common dolphin (Heyning and Perrin 1994; see above), an assessment of its long-term population trend, distribution and other factors is difficult. Many researchers simply group both species together as *Delphinus* spp. (U.S. Navy 2002).

Based on more recent data, authorities generally recognize that the long-beaked common dolphin usually occurs within 50 nm of shore (Heyning and Perrin 1994; Carretta et al. 2000), thus it is assumed that common dolphin sightings farther offshore represent the short-beaked common dolphin rather than the long-beaked common dolphin. During the 4H Project, long-beaked common dolphins were observed in the area on three occasions for a total of 879 animals. Two large groups were seen one day, and a single animal was seen the next. The long-beaked common dolphin is the most likely species of oceanic dolphin that could be encountered at or near the project site.

BOTTLENOSE DOLPHIN, CALIFORNIA COASTAL STOCK (*TURSIOPS TRUNCATUS*)

The California coastal stock of this species is extremely small (206 animals), so it is considered vulnerable to declines from any source (Carretta et al. 2001).

The coastal bottlenose dolphin ranges from the surf zone out to approximately 0.5 nm offshore (Carretta et al. 2001). Coastal bottlenose dolphins appear to be more common in the SCB during the warmer water months. They favor temperate to subtemperate waters and feed on fish (Leatherwood et al. 1982). Although they are commonly seen inshore from the project site, they will not appear at or near the site because of their affinity for very shallow coastal waters.

Prior to the 1982-1983 El Niño event, the stock generally ranged from northern Los Angeles County into Baja California. During the El Niño event, however, these dolphins ventured as far north as central California and were reported off San Francisco. Since that period, bottlenose dolphins have remained in the coastal waters from Ventura County north to southern San Francisco County (Carretta et al. 2001). Their southern range limit extends at least to Ensenada, Baja California. Coastal bottlenose dolphins

are likely to be encountered off the Santa Barbara County coast, although never in large numbers. During the 4H Project, a total of 18 coastal bottlenose dolphins were observed well inshore from the project site (Howorth 1996). Coastal bottlenose dolphins were also observed in the area during Chevron's proprietary studies, again very close to shore (Howorth 1998b).

PACIFIC WHITE-SIDED DOLPHIN (*LAGENORHYNCHUS OBLIQUIDENS*)

The Pacific white-sided dolphin may be the most abundant oceanic dolphin in the North Pacific. It ranges eastward from 180 degrees west longitude from Baja California to southern Alaska (Leatherwood et al. 1982; Leatherwood et al. 1987). Two stocks are recognized. The northern stock ranges from Point Conception all the way to Alaska, where a separate stock has been set aside for management purposes (Carretta et al. 2001). The remainder of the northern stock and the southern stock, which ranges from the Santa Barbara Channel to Baja California, is managed as the California/Oregon/Washington stock. The California/Oregon/ Washington stock size has been estimated at 25,825 animals (Carretta et al. 2001). The two stocks may intermix. Although individuals in the southern stock are larger, the two forms cannot be distinguished in the field (Barlow et al. 1997; Carretta et al. 2001).

Both northern and southern stocks appear to favor subtemperate to cold temperate waters. The southern stock generally remains inshore from the warm California Current. In the Santa Barbara Channel, Pacific white-sided dolphins are most often seen off the escarpments along the north shores of the Channel Islands, often in association with humpback whales. The presence of this species at the project site is unlikely.

NORTHERN RIGHT WHALE DOLPHIN (*LISSODELPHIS BOREALIS*)

The northern right whale dolphin (the only dolphin in this region that lacks a dorsal fin) ranges as far north as Oregon and Washington in summer and fall. Its southern range limit is probably northern Baja California. The California/Oregon/Washington stock has been estimated at 13,705 animals (Carretta et al. 2001).

Northern right whale dolphins generally appear during cold water months, especially during La Niña events. They most often appear near San Miguel and San Nicolas Islands and north of Point Conception, well offshore. Their presence at or near the project site is unlikely.

RISSE'S DOLPHIN (*GRAMPUS GRISEUS*)

Risso's (pronounced "REES-soh-sez") dolphins are found throughout the SCB year-round in varying numbers. Their occurrence in the SCB increased considerably following the 1982-1983 El Niño event, but recent population trends are not known. They are abundant along the escarpments off the four northern Channel Islands and off the coast north of Point Conception. The California/Oregon/Washington stock ranges from at least northern Baja California to Washington, although sightings have been made in the Gulf of Alaska. The stock size is 16,483 animals (Carretta et al. 2001).

3.4 Marine Wildlife

1 Another stock seems to exist off the southern tip of Baja California and in the Gulf of
2 Mexico.

3 Risso's dolphins are frequently seen near the Channel Islands and along the mainland
4 coast near escarpments. It is unlikely that they will appear at or near the project site
5 because of their preference for deeper offshore waters.

6 KILLER WHALE (*ORCINUS ORCA*)

7 In California, killer whales are currently referred to as either the eastern North Pacific
8 transient stock or the eastern North Pacific offshore stock (NMFS 1999b and c; Carretta
9 et al. 2001). The transient stock ranges from California to as far north as Alaska and
10 eastern Russia. This stock occasionally mixes with a resident stock found in
11 Washington and British Columbia (NMFS 1999b). The latest estimate of the transient
12 stock size is 346 animals (Carretta et al. 2001). Population trends in California are not
13 known at this time, although sightings of increasingly large pods have been reported
14 recently during the northbound gray whale migrations (pers. comm., Connally, Island
15 Packers Company, 2001). Killer whales have been seen within a few miles of the
16 project site on occasion, although their presence is not common there.

17 The offshore stock occurs from California through Washington, although a few
18 individuals from this stock have been identified in Southeast Alaska. From the
19 literature, it is not clear how close to shore this stock comes, nor whether its range
20 overlaps that of the transient stock, but sightings of the offshore stock have extended up
21 to 300 nm off the coast (Carretta et al. 2001). The offshore stock is not known to
22 intermix with the transient stock. The current estimated offshore minimum stock size is
23 285 (Carretta et al. 2001). These two stocks of killer whales appear to favor
24 subtemperate to cold temperate waters.

25 Transient and offshore killer whales appear to feed mainly on other marine mammals.
26 In the Santa Barbara Channel, including the mainland coast, killer whales have been
27 observed feeding on gray whales, Pacific harbor seals and California sea lions
28 (Howorth, Santa Barbara Marine Mammal Center [SBMMC], unpublished field notes
29 1965-2001; pers. comm., Sussman, Research Vessel Spirit, 1988). They have also
30 been seen feeding on fish. One killer whale was videotaped eating a great white shark
31 (*Carcharodon carcharias*) off California (Pyle et al. 1999).

32 OTHER OCEANIC DOLPHINS

33 The offshore stock of bottlenose dolphins (*Tursiops truncatus*) is associated with warm
34 temperate to subtemperate waters. This stock ranges from Mexico to northern
35 California, although some specimens have been reported off Oregon and Washington
36 during El Niño events. In the SCB, offshore bottlenose dolphins frequent the waters off
37 Santa Catalina Island and, to a lesser extent, San Clemente and Santa Barbara Islands
38 (Carretta et al. 2000 and 2001). They have also been observed in the Santa Cruz
39 Basin, south of Santa Cruz Island. The offshore stock occasionally ventures into the
40 south part of the Santa Barbara Channel, usually in summer. The presence of this

stock at or near the project site is extremely unlikely. The stock size is estimated at 956 animals (Carretta et al. 2001).

The short-finned pilot whale (*Globicephala macrorhynchus*) was once abundant off the southern Channel Islands. A resident population existed off Santa Catalina Island (Dohl et al. 1981). The short-finned pilot whale was also common in the Santa Cruz Basin, south of Santa Cruz Island, and was often sighted in the Santa Barbara Channel. Progressively more individuals have been seen in the SCB recently, but the population has not regained its former numbers. The occasional presence of this species is possible off the Channel Islands, but the chances of it occurring at or near the project site are extremely remote. The California/Oregon/Washington stock is now estimated at 970 individuals (Carretta et al. 2001).

The species listed below occur in tropical to offshore subtropical waters and have never been reported near the project site. Some of these species are known in California only from strandings. The chances of any of these species occurring near the project site are extremely remote.

- False killer whale (*Pseudorca crassidens*),
- Spotted dolphin (*Stenella attenuata*),
- Striped dolphin (*Stenella coeruleoalba*),
- Long-snouted spinner dolphin (*Stenella longirostris*), and
- Rough-toothed dolphin (*Steno bredanensis*).

DALL'S PORPOISE (*PHOCOENOIDES DALLI*)

The Dall's porpoise is probably the most abundant small cetacean in the North Pacific (Barlow et al. 1997; Carretta et al. 2001), but not in the project area. The California, Oregon and Washington stock size has been estimated at 117,545 (Carretta et al. 2001).

Dall's porpoises prefer cold temperate waters 17 degrees C and below (Leatherwood et al. 1982). They generally appear in the SCB in winter, when the water is coldest. During La Niña years, they may venture into northern Baja California (Barlow et al. 1997; Forney et al. 2000). They could be seen near the project site during cold-water months.

Dall's porpoises feed on fish and cephalopods. Prey includes anchovies, Pacific saury (*Cololabis saira*), juvenile rockfish (*Sebastes* spp.), hake, jack mackerel (*Trachurus symmetricus*), and squid (Leatherwood et al. 1982).

HARBOR PORPOISE (*PHOCOENA PHOCOENA*)

Several stocks of harbor porpoises are managed separately in the eastern North Pacific. Stocks now recognized in California, Oregon and Washington include the Morro Bay stock, the Monterey Bay stock, the San Francisco-Russian River stock, the

northern California/southern Oregon stock, the Oregon/Washington coast stock, and the inland Washington stock. Other stocks include the Southeast Alaska stock, the Gulf of Alaska stock and the Bering Sea stock. The central California stock is estimated at 932 (Carretta et al. 2002).

Most sightings of harbor porpoises in central California are within 0.25 to 0.5 nm of shore. Sightings of harbor porpoises south of Point Conception are rare, but are most often reported in fall and winter. The likelihood of any harbor porpoises being encountered at the project site is remote.

BEAKED AND SPERM WHALES

The beaked and sperm whales listed below are known on the mainland coast only from strandings, except that individual sperm whales have been reported on three occasions in the Santa Barbara Channel. All of the species listed below frequent deep offshore waters. The chances of any of these species appearing at the project site are extremely remote.

- Baird's beaked whale (*Berardius bairdii*),
- Cuvier's beaked whale (*Ziphius cavirostris*),
- Hubb's beaked whale (*Mesoplodon carlhubbsi*),
- Blainville's beaked whale (*Mesoplodon densirostris*),
- Ginkgo-toothed whale (*Mesoplodon ginkgodens*),
- Perrin's beaked whale (*Mesoplodon perrini*; previously described in this region as Hector's beaked whale, *Mesoplodon hectori*)
- Stejneger's beaked whale (*Mesoplodon stejnegeri*),
- Pygmy sperm whale (*Kogia breviceps*),
- Dwarf sperm whale (*Kogia simus*), and

CALIFORNIA GRAY WHALE (*ESCHRICHTIUS ROBUSTUS*)

California gray whales range from Baja California, occasionally including the Gulf of California and mainland Mexico, to Alaska. Some individuals may venture as far east as Russia or parts of Asia. In the last 4 years, however, the population has undergone a significant decline, from a high of 26,635 in 1998 (Rugh et al. 1999) to 17,414 in 2002 (Rugh 2002). The cause for this decline is not fully understood, but theories include that the stock is reaching carrying capacity and, consequently, that prey is dwindling, or that prey is dwindling because of a general warming trend in the ocean (Le Boeuf et al. 1999; Moore et al. 2001).

California gray whales generally begin migrating south in late fall or winter from their feeding grounds in the Bering and Chukchi seas. Over the past few years, some individuals have been observed heading south as early as October and November, but generally, the migration does not begin in earnest off the SCB until late December. The

1 southbound migration continues through February. By mid-February, some individuals
2 are also heading north. The northbound migration peaks in March but continues into
3 May. Generally, the mothers with calves are the last to head north.

4 Migration corridors generally follow the coast, although south of Point Conception, they
5 tend to diverge, with one track extending along the west ends of the island groups,
6 another threading through the islands, and still another following the coast. In general,
7 the whales tend to stay farther offshore and cut corners on their way south, while the
8 northbound migration tends to more closely follow the coast, at least north of Point
9 Conception. Near the project site, an inshore corridor extends just off the beaches to
10 about 4 nm offshore. Others exist in mid-channel, along the north shore of Santa Cruz
11 Island, and in the passages between the islands. The majority of northbound gray
12 whales tend to follow the mid-channel or island migration corridors (Carretta et al. 2000;
13 Howorth 1998b). Gray whales may appear near the project site during migrations,
14 especially during the northbound migration, from mid-February through May.

15 Gray whales have been observed feeding during their migrations, particularly on their
16 way north. They have been observed throughout the SCB feeding on amphipods in
17 fronds of giant kelp, sand crabs (*Emerita analoga*) along the surf line and krill (*Euphasia*
18 spp.; pers. comm., Anderson, UCSB, 1995; Howorth, SBMMC, unpublished field notes
19 1965-2001). Through the summer of 2000, two gray whales stayed at San Miguel
20 Island, feeding upon unidentified small crustaceans above the sea floor in Cuyler
21 Harbor and Tyler Bight (pers. comm., DeLong, NOAA, 2000). Nonetheless, the vast
22 majority of gray whales journey to the feeding grounds in the far north.

23 MINKE WHALE (*BALAENOPTERA ACUTOROSTRATA*)

24 Minke (pronounced "MEEN-kee") whales in the eastern North Pacific are managed as
25 two stocks, one for Alaska, the other for California, Oregon and Washington. The two
26 stocks exhibit different behavior so they are treated separately. The
27 California/Oregon/Washington stock appears to be resident (NMFS 1998b; Carretta et
28 al. 2001). The best estimate of the California/Oregon/Washington stock is 631 (Carretta
29 et al. 2001). This stock ranges from the west coast of Baja California to Washington
30 along the continental borderland. Another resident stock exists in the Gulf of California.

31 Minke whales are most abundant in spring and summer in the SCB (Dohl et al. 1981).
32 Some researchers believe that minke whales may venture into the SCB from offshore or
33 from the south in spring, remain there in summer, then move farther offshore or south
34 again.

35 Minke whales are not abundant in the Santa Barbara Channel, and in general, sightings
36 have become less frequent over the past several years. Most sightings involve
37 individual animals, with occasional sightings of two to five animals in a general area.
38 During the 4H Project, three individual minke whales were observed some miles
39 offshore from the project site. An unidentified whale, which was probably also a minke,
40 was observed in the same area. Minke whales could appear at or near the project site,
41 but only uncommonly and never in numbers.

BRYDE'S WHALE (*BALAENOPTERA EDENI*)

The number of Bryde's (pronounced "BREW-duhs") whales off California, Oregon and Washington is estimated at only 12 individuals (Carretta et al. 2001). Only one Bryde's whale was positively identified in surveys conducted in 1991 and 1993 (Barlow 1995; Forney et al. 1995; Barlow and Gerrodette 1996). It was seen off central California. Another Bryde's whale was seen and photographed by one of the authors off Santa Rosa Island in 1993 (Howorth, SBMMC, unpublished field notes 1965-2001). Bryde's whale sightings have been so rare in California that the chances of encountering any Bryde's whales at or near the project site are extremely remote.

Non-Listed Species of Pinnipeds

All pinnipeds are protected under the MMPA and its amendments. Otherwise, the species discussed in this section have no special protection status. Listed threatened and endangered species are discussed below under a separate heading. Non-listed species that are known or have some potential to occur at or near the project site are summarized in Table 3.4-2 and discussed in detail in the species accounts. The level of detail provided for regularly or occasionally occurring species is necessary because any take involving a marine mammal would be considered significant. Summaries are provided for species that have not been reported at or near the project site, but that are known from only a few sightings or strandings in the SCB, as well as for species that frequent deep offshore waters of the continental slope and deep ocean in the region.

Prey preferences are provided for species known to occur regularly in the region because some of the prey organisms are known to accumulate some of the types of potentially toxic substances present in the shell mounds. Potential impacts from such substances are discussed in Section 3.4.4.1.

**Table 3.4-2. Occurrence of Non-Listed Species of Pinnipeds
in or near the Project Site**

| <i>Species</i> | <i>Population or Stock Size</i> | <i>Occurrence in SCB</i> | <i>Reported near Project Site</i> | <i>Potential Occurrence</i> |
|--|-------------------------------------|------------------------------|---------------------------------------|---------------------------------|
| California sea lion | 204,000-214,000 | Abundant | Yes | Extremely likely |
| Pacific harbor seal | 30,293 | Common | Yes | Likely |
| Northern elephant seal | 101,000 | Common | Yes | Unlikely |
| Ribbon seal | Not available for SCB | Extremely rare | Yes | Extremely remote |
| Northern fur seal | 4,336 | Uncommon | No | Extremely remote |
| <i>Sources: Carretta et al. 2001 and 2002.</i> | | | | |

CALIFORNIA SEA LION (*ZALOPHUS CALIFORNIANUS* C.)

California sea lions frequent warm temperate to subtemperate waters. Three subspecies are recognized. *Zalophus californianus wollebecki* occurs at the Galapagos Islands. *Zalophus californianus japonicus* was once found in the waters off Japan but is now thought to be extinct there. *Zalophus californianus* c. ranges from Mexico to British Columbia (Carretta et al. 2001).

California sea lions are divided into three stocks: the Gulf of California stock, the western Baja California stock and the U.S. stock. The U.S. stock ranges from the California-Mexico border to British Columbia. California sea lions frequent the continental borderland, although they have been reported along the continental slope and deep water well offshore. The U.S. stock has been estimated at between 204,000 and 214,000 (Carretta et al. 2001). Some recruitment may occur from Mexico (pers. comm., Lowry, NOAA, 2000). The California sea lion population has been increasing except for brief declines during major El Niño events.

California sea lions breed and pup at some of the Channel Islands of the SCB, the islands off western Baja California and islands in the Gulf of California. Not only may some recruitment from Mexico take place, but also adult males tagged in Mexico have been reported in California (pers. comm., Gamboa, CiCiMar, 1997-2002; pers. comm., DeLong, NOAA, 1998-2001).

Adult males haul out to establish territories in mid-May. Most remain until late July, then migrate north to feeding grounds as far north as British Columbia. Females bear their young from mid-June through mid-July. They breed 3 to 4 weeks later. The pups are weaned after about 8 months. Some will continue to nurse for a year or more. Others are weaned as early as 4 months. The pups are able to catch their own prey by the time they are a few months old, so they can survive on their own if separated from their mothers. Adult females and subadults spend most of the year near the rookeries or along the mainland coast nearby. They frequently haul out on mooring buoys near oil platforms, the platforms themselves, and sometimes on anchored boats and in marinas.

California sea lions are by far the most abundant species of pinniped in the SCB and are present in the project area. During the 4H Project, sightings of California sea lions outnumbered sightings of all other species combined. A total of 604 animals was seen during the line transect surveys, while 149 others were observed in or near the hazard zone maintained for the protection of marine mammals during demolition activities (Howorth 1996). California sea lions were also abundant throughout the area during the Chevron proprietary studies (Howorth 1998b).

In the SCB, California sea lions feed primarily upon market squid (*Loligo opalescens*), northern anchovies (*Engraulis mordax*) and Pacific whiting. Mainland coastal waters in Southern and Central California are important feeding grounds for adult females and juveniles.

1 PACIFIC HARBOR SEAL (*PHOCA VITULINA RICHARDSI*)

2 Harbor seals are the most widely distributed pinniped in the northern hemisphere,
3 occurring in both the North Atlantic and North Pacific oceans as well as in many
4 adjacent seas. Two subspecies are recognized in the Pacific: *Phoca vitulina stejnegeri*
5 in the western North Pacific near Japan, and *Phoca vitulina richardsi* in the eastern
6 North Pacific. The regional subspecies occurs from Baja California to the Pribilof
7 Islands in the Bering Sea. This subspecies generally frequents subtemperate to
8 subpolar waters (Carretta et al. 2001).

9 On the west coast of America, six stocks of harbor seals are recognized: the California
10 stock, the Oregon-Washington outer coastal waters stock, the Washington inland
11 waters stock, and three stocks in the coastal and inland waters of Alaska (Angliss et al.
12 2001; Carretta et al. 2001). The California stock ranges from the U.S.-Mexico border to
13 the California-Oregon border. Harbor seals throughout this region are distributed
14 throughout continental borderland waters. The California stock size is 30,293 (Carretta
15 et al. 2001). Overall, numbers have been increasing substantially since the 1960s,
16 although occasional recruitment downturns have occurred during major El Niño events.
17 Also, in some areas of the Channel Islands the populations are beginning to stabilize or
18 even decline. This may be attributable to the populations approaching carrying capacity
19 or to encroachment of rookery areas by northern elephant seals (*Mirounga*
20 *angustirostris*).

21 Harbor seals generally bear their young from February through May, although early
22 arrivals have been documented in December and January at some rookeries (SBMMC
23 unpublished records 1976-2002; Stewart and Yochem 1994). The peak period for
24 pupping is late February and March. Harbor seals usually come ashore in greatest
25 numbers in May and June, when they molt. Harbor seals spend much of their time at
26 sea, usually within several miles of their rookeries and haul-out areas. However, some
27 tagged individuals have been reported a few hundred miles away from their rookeries.

28 Unlike other pinnipeds, harbor seals have small rookeries and haul-out areas, usually
29 consisting of a few dozen to a few hundred individuals. These areas are widespread
30 throughout the islands and coast of California. In all, 400 to 500 haul-out sites probably
31 exist (Carretta et al. 2001). Rookeries and haul-out areas exist at all of the Channel
32 Islands, with the largest rookeries usually at the largest islands (Stewart and Yochem
33 1994). Along the mainland coast of the SCB, however, haul-out and rookery sites are
34 relatively scarce. Rookeries exist immediately east of Point Conception, at Ellwood,
35 west of Santa Barbara, at Carpinteria, and at Mugu Lagoon, which is at the Naval Air
36 Warfare Center, Pt. Mugu. The closest rookery to the project site is at Carpinteria,
37 nearly 5 nm to the east.

38 During the Chevron proprietary studies, harbor seals were seen throughout the area,
39 almost always as individual animals (Howorth 1998b). During the 4H Project, only one
40 harbor seal was observed during the line transect surveys, while 23 individuals were
41 seen in or near the hazard zone (Howorth 1996). Small numbers of harbor seals will be

encountered at the project site, although they are physically incapable of hauling out on buoys or oil platforms.

Nursing females generally forage in shallow water (10 to 40 meters), while the others dive 80 to 120 meters in search of food. Diet includes various species of rockfish (*Sebastes*, spp.), spotted cusk eels (*Chilara taylori*), octopi (*Octopus* spp.), plainfin midshipman (*Porichthys notatus*), and shiner surfperch (*Cymatogaster aggregata*).

NORTHERN ELEPHANT SEAL (*MIROUNGA ANGUSTIROSTRIS*)

The California breeding stock of the northern elephant seal is 101,000 (Carretta et al. 2002). Another breeding stock exists on several islands off the west coast of Baja California. A few individuals have been appearing regularly in the Gulf of California (pers. comm., Gamboa, CiCiMar, 1997-2001). The California breeding stock has several rookeries. The largest are at San Miguel and San Nicolas Islands. Small rookeries exist at Santa Rosa and Santa Barbara Islands. Other rookeries include Piedras Blancas, near San Simeon, and Año Nuevo Island, both in central California. Rookeries also exist at Southeast Farallon Island and Point Reyes, both near San Francisco (Barlow et al. 1993). Elephant seals haul out occasionally in small numbers or as individuals at Santa Cruz and Anacapa Islands. Northern elephant seals generally frequent deeper waters offshore in the SCB.

Northern elephant seals appear at the various rookeries from December to March. Most pups are born in February and weaned in about 1 month. The pups venture to sea 1 to 3 months after they are weaned. Both males and females leave the rookeries after the pupping and breeding season. The females range north between 40 and 45 degrees north latitude, or from south of Eureka, California, to Lincoln City, in northern Oregon. Males travel all the way to the Gulf of Alaska and the eastern Aleutians. Adults return to rookery and haul-out areas from March through August to molt (Carretta et al. 2001). In all, northern elephant seals spend 8 to 10 months at sea north of the SCB. They waste little time getting to and from their feeding grounds during their two migrations. It is unlikely that they will be encountered at or near the project site. None were seen in the area during the 4H Project or during Chevron's proprietary studies (Howorth 1996 and 1998b). Nonetheless, from 20 to 40 juveniles are taken in for treatment at the Santa Barbara Marine Mammal Center every year. Most appear in spring and early summer (SBMMC, unpublished records, 1976-2003).

RIBBON SEAL (*HISTRIOPHOCA FASCIATA*)

The ribbon seal usually ranges from Pt. Barrow, Alaska, south to near the tip of the Alaska Peninsula. It is also found along part of the coast of Asia in the western Pacific. Interestingly, one specimen was observed ashore at Carpinteria, California (pers. comm., Woodhouse, SBMNH, 1995). Another specimen was captured on a beach south of Morro Bay in November 1962. The chances of this species occurring at or near the project site are extremely remote.

1 NORTHERN FUR SEAL (*CALLORHINUS URSINUS*)

2 Two stocks of northern fur seals are recognized: the eastern Pacific stock which occurs
3 in the Bering Sea and comprises nearly the entire U.S. population, numbering about
4 983,918 (Angliss et al. 2001); and the San Miguel Island stock, which numbers 4,336
5 (Carretta et al. 2001). The San Miguel Island stock has been generally increasing since
6 the recolonization of San Miguel Island by this species in the late 1950s, although
7 declines were noticed following the 1982-1983 and 1997-1998 El Niño events (NMFS
8 1998a; Carretta et al. 2001).

9 At San Miguel Island, adult males come ashore to set up territories and breed from May
10 through August. Some may remain as late as November after having relinquished their
11 territories. Females come ashore in June and generally remain as late as November.
12 The eastern Pacific stock remains far to the north during this period except for some
13 recruitment of this stock to San Miguel Island. By December, virtually all the seals at
14 San Miguel have ventured offshore into pelagic waters beyond the continental slope,
15 where they stay until the next season. Pups may remain at sea for as much as 22
16 months before returning to the island. Northern fur seals can be found in pelagic waters
17 from California north to the Bering Sea at all times of the year, although animals from
18 the eastern Pacific stock generally do not appear off California until December through
19 April. Northern fur seals frequent the waters of the SCB west of the islands, but only
20 come ashore at San Miguel (NMFS 1998a; Carretta et al. 2001). Thus, even though
21 northern fur seals number in the thousands at nearby San Miguel Island, the chances of
22 any appearing at the project site are extremely remote.

23 *Threatened and Endangered Species of Marine Mammals*

24 Off California, six species of marine mammals are listed as endangered under the
25 federal Endangered Species Act, while another three species are listed as threatened.
26 The listed species include six cetaceans [five mysticetes (baleen whales) and one
27 odontocete (toothed whale)], two pinnipeds (seals and sea lions), and one carnivore
28 (the southern sea otter). The California gray whale (*Eschrichtius robustus*), a mysticete,
29 was delisted in 1993 after the stock recovered (Rugh et al. 1999). No additional species
30 of marine mammals are proposed for listing as threatened or endangered.

31 Several stocks of endangered whales, including the California stocks of mysticetes
32 discussed later in this section, are classified as strategic under the federal Marine
33 Mammal Protection Act of 1972 (MMPA; Carretta et al. 2001). The definition of
34 “strategic” is complex, but in this context it refers to a stock of whales that is being
35 negatively impacted by human activities and may not be sustainable, thus it is of
36 strategic importance at a regional or population level. Under the MMPA, some species
37 are also considered “depleted,” in which the population falls below optimum sustainable
38 levels. Such species include the endangered rorquals (balaenopterid whales), the
39 northern right whale and the sperm whale (Carretta et al. 2001; Angliss et al. 2001).

No critical habitat has been established for any of the threatened and endangered marine mammal species in the SCB, thus no critical habitat for these species would be affected by project activities.

Marine mammals that are listed as threatened or endangered are summarized in Table 3.4-3. Additional details are provided in the species accounts, which follow. As for non-listed species, a greater level of detail is provided for species that occur regularly in the region.

Table 3.4-3. Occurrence of Threatened and Endangered Species of Marine Mammals in or near the Project Site

| <i>Species</i> | <i>Status</i> | <i>Stock size</i> | <i>Occurrence in SCB</i> | <i>Reported Near Project Site*</i> | <i>Potential Occurrence</i> |
|--|---------------|-------------------|--------------------------------|------------------------------------|-----------------------------|
| CETACEANS | | | | | |
| Sei whale | Endangered | Not available | Extremely rare | No | Extremely remote |
| Blue whale | Endangered | 1,940 | Seasonally abundant in channel | No | Remote |
| Fin whale | Endangered | 1,851 | Uncommon in channel | No | Extremely remote |
| Humpback whale | Endangered | 856 | Seasonally abundant in channel | Occasionally in season | Possible in season |
| Northern right whale | Endangered | Not available | Extremely rare | No | Extremely remote |
| Sperm whale | Endangered | 1,407 | Rare in channel | No | Extremely remote |
| PINNIPEDS | | | | | |
| Steller sea lion | Threatened | 31,005 | Extremely rare | No | Extremely remote |
| Guadalupe fur seal | Threatened | 7,408 | Rare | No | Extremely remote |
| CARNIVORES | | | | | |
| Southern sea otter | Threatened | 2,505 spring 2003 | Small numbers elsewhere | No | Unlikely |
| * Within 4 nmi <i>Sources:</i> Carretta et al. 2001 and 2002; Angliss et al. 2001; NOAA 2000a; USGS 2003. | | | | | |

SEI WHALE (*BALAENOPTERA BOREALIS*)

The sei (pronounced "say") whale is federally listed as endangered. It is considered strategic and depleted under the MMPA. Population trends are unknown (Carretta et al.

3.4 Marine Wildlife

2001). Sei whales in the eastern North Pacific, east of 180 degrees west longitude, are managed as a separate stock. No stock size estimates are available for the eastern North Pacific stock.

In general, sei whale sightings in the SCB have been very rare in the past two decades. Most sightings have been in spring and summer, well offshore. In the 1950s and 1960s, however, sei whales were often caught by whalers off California (Daugherty 1985; Rice 1974). Sei whales were most often encountered off central California but may have ranged as far south as offshore from the southern Channel Islands. Sei whales have only rarely been reported south of California, however (Wade and Gerrodette 1993; Lee 1993). It is extremely unlikely that sei whales will be encountered at or near the project site.

BLUE WHALE (*BALAENOPTERA MUSCULUS*)

The blue whale is listed as endangered under the federal ESA and is considered strategic and depleted under the MMPA. The eastern North Pacific stock has been more abundant for more than a decade, but whether this represents a genuine stock increase or a change in distribution is unknown (Carretta et al. 2001).

Two stocks of blue whales are recognized by NOAA Fisheries for management purposes. One is the Hawaiian stock; the other is the eastern North Pacific stock, which feeds in California in summer and fall and migrates to Mexico for winter and spring. The stock size is estimated at 1,940 (Carretta et al. 2002).

Blue whales have been showing up in sizable numbers in the SCB for more than a decade. They usually appear in June and stay through the summer. By early fall, they are often farther north, off central or northern California. They usually leave by November and spend their winters off Mexico and Central America (Larkman and Veit 1998; pers. comm., Calambokidis, Cascadia Research Collective, 2000). Blue whales have been reported off California throughout the year, but never in large numbers in winter and spring. The eastern North Pacific stock of blue whales seems to favor temperate to subtemperate waters during warm water months.

Blue whales favor escarpments and basins along the southern reaches of the Santa Barbara Channel. They are rarely seen close to the mainland coast of Santa Barbara County and have not been reported at or near the project site. The chances of any blue whales appearing at or near the project site are remote. Only two blue whales were seen in the area during the Chevron proprietary studies. Both were in mid-channel (Howorth 1998b).

FIN WHALE (*BALAENOPTERA PHYSALUS*)

The fin whale is listed as endangered under the federal ESA and is considered strategic and depleted under the MMPA. The California/Oregon/Washington stock may have grown during some years over the past two decades, but not significantly.

For management purposes, three stocks of fin whales are recognized: the Hawaii stock, the Alaska stock and the California/Oregon/Washington stock. The California/Oregon/Washington stock generally frequents waters along the continental slope and farther offshore, although some fin whales have been seen along escarpments frequented by blue whales (see previous section). The California/Oregon/Washington stock size has been estimated at 1,851 (Carretta et al. 2002).

In the SCB, fin whales are generally seen more often during warm-water months in the offshore waters of the continental borderland. In fall, fin whales have been sighted frequently west of San Nicolas Island during various surveys. They have also been sighted occasionally in the Santa Barbara Channel during the warm water months. Perhaps coincidentally, the numbers of fin whales increase in the Gulf of California during the colder water months (Tershey et al. 1993). Whether this represents the same stock of whales is not clear. Fin whales are rare near the mainland coast. No sightings have been reported at or near the project site. The odds of fin whales appearing at or near the project site are extremely remote.

HUMPBACK WHALE (*MEGAPTERA NOVAEANGLIAE*)

The humpback whale is listed as endangered under the federal ESA and is considered strategic and depleted under the MMPA (NMFS 1999e; Carretta et al. 2001). The eastern North Pacific stock may be increasing.

The eastern North Pacific stock of humpback whales ranges from Central America and Mexico north through Washington State. Only two photo-identification matches have been made out of 81 identifications made off British Columbia, indicating that the U.S.-Canada border marks the approximate northern range limit of this stock. The southern limit of the eastern North Pacific stock appears to be off the coast of Costa Rica, although the bulk of the population probably frequents the waters off Mexico. The eastern North Pacific stock size is 856 (Carretta et al. 2002).

Humpbacks have been sighted in large numbers at the Santa Lucia Bank, off central California. Off San Clemente Island, they have occasionally been seen to the southwest during warm water months (Carretta et al. 2000). They winter off Mexico and Central America, including some of the offshore islands and the Gulf of California.

Humpbacks generally appear in the SCB in late May and stay through summer, although sporadic sightings have been reported year-round. Like blue whales, they often head farther north in late summer and fall. Humpbacks, like blues, tend to congregate along escarpments. In summer, they are common along the north shore of the northern Channel Islands. During the 4H Project, two individual humpbacks were observed in the area (see Figure 3.4-5). Eight humpbacks were reported during Chevron's proprietary studies, all from mid-channel to within 5 nm of the islands (Howorth 1998b). In 2002, from one to four humpbacks were reported in an area from 2 to 4 miles offshore from due south of Santa Barbara to Coal Oil Point, to the west of

3.4 Marine Wildlife

1 Santa Barbara and several miles from the project site (SBMMC, unpublished records,
2 2002). In general, humpback sightings are uncommon near the project site.

3 Humpbacks feed primarily on krill and small schooling fish. In the Santa Barbara
4 Channel, they have been observed feeding on krill (*Euphasia* spp.), northern anchovies
5 (*Engraulis mordax*) and Pacific sardines (*Sardinops sagax caeruleus*). They have been
6 observed feeding on northern anchovies off central California (Howorth, SBMMC,
7 unpublished field notes 1965-2001).

8 NORTHERN RIGHT WHALE (*EUBALAENA GLACIALIS*)

9 The northern right whale is endangered under the federal ESA and strategic and
10 depleted under the MMPA. It is the most gravely endangered mysticete in the region.
11 The population may be beyond recovery.

12 Historically, northern right whales occurred throughout the North Pacific from 35
13 degrees north latitude, or off the Avila Beach – Morro Bay area, to the arctic. Sporadic
14 sightings were reported as far south as 20 degrees north latitude, or off central Mexico.
15 No official estimates are available for the current stock size, but from 100 to 200
16 animals were thought to exist some years ago (Wada 1973; Braham and Rice 1984).

17 Only one calf has been reported in the eastern North Pacific since 1900. For the years
18 1855 to 1982, 23 reliable sightings of northern right whales were documented by Scarff
19 (1986). A number of sightings, some historic, have been reported by other researchers
20 over the years. Two sightings have been made in the Santa Barbara Channel, neither
21 near the project site. The southernmost sighting in recent years was made off Cabo
22 San Lucas, Baja California, in 1998 (Gendron et al. 1999). Considering the rarity of this
23 species, the chances of it appearing at the project site are extremely remote.

24 SPERM WHALE (*PHYSETER MACROCEPHALUS*)

25 The sperm whale is the only odontocete (toothed whale) federally listed as endangered.
26 It is considered strategic and depleted under the MMPA. Current population trends are
27 not known.

28 For the MMPA stock assessments, sperm whales are divided into three areas:
29 California/Oregon/Washington, Hawaii and Alaska. The best estimate of the California/
30 Oregon/Washington stock size is 1,407 (Carretta et al. 2002).

31 Sperm whales are widely distributed across the entire North Pacific and into the
32 southern Bering Sea in summer. They are found year-round off the California coast,
33 with peak numbers occurring from April through mid-June and from the end of August
34 through mid-November (Rice 1974).

35 Sperm whales frequent deep offshore waters. They are known on the mainland coast
36 only from strandings, except that individual sperm whales have been reported on three
37 occasions in the Santa Barbara Channel. The chances of any sperm whales appearing
38 at the project site are extremely remote.

1 STELLER SEA LION (*EUMETOPIAS JUBATUS*)

2 In 1997, Steller sea lions were reclassified into two separate stocks within U.S. waters:
3 an eastern stock, including animals east of Cape Suckling, Alaska (144 degrees west
4 longitude); and a western stock, including animals at and west of Cape Suckling. The
5 eastern stock of Steller sea lions is threatened under the ESA, while the western stock
6 is endangered because of major population declines. Both populations are now
7 considered strategic and depleted.

8 The most recent minimum abundance estimate of the eastern stock of Steller sea lions
9 is 31,005 (Angliss *et al.* 2001). Steller sea lion numbers in California have declined
10 considerably, from 5,000 to 7,000 non-pups from 1927-1947, to 1,500 non-pups
11 between 1980 and 1998 (Angliss *et al.* 2001).

12 Steller sea lions prefer cold temperate waters. Steller sea lions once appeared in early
13 summer and remained into the fall at San Miguel Island. They were last reported at San
14 Miguel Island during the 1982-1983 El Niño (NMFS 2000a). Historically, Steller sea
15 lions have been seen occasionally at San Nicolas Island but have not been observed
16 there for decades (Bartholomew 1951; Bartholomew and Boolotian 1960). One adult
17 female was seen off Refugio, west of Santa Barbara, in 1987 (Howorth, SBMMC,
18 unpublished field notes 1965-2001). No Steller sea lions have been reported stranded
19 in Santa Barbara County over the past 26 years (SBMMC, unpublished records 1976-
20 2002; pers. comm., Collins, SBMNH, 2002). Considering the extreme rarity of this
21 species in the SCB, the chances of it appearing at the project site are extremely remote.

22 GUADALUPE FUR SEAL (*ARCTOCEPHALUS TOWNSENDI*)

23 The Guadalupe fur seal is listed as threatened under both the federal and State ESAs.
24 It is also considered depleted and strategic under the MMPA. The population appears
25 to be growing at about 13.7 percent a year.

26 The Guadalupe fur seal has only one population, which is concentrated off Guadalupe
27 Island off Mexico. Recently, some pups have been reported at Isla de Benito del Esta,
28 Baja California (Maravilla-Chavez and Lowry 1997). Guadalupe fur seals have also
29 been reported in the Gulf of California (Gamboa *et al.* 1999). The stock size is 7,408
30 (Carretta *et al.* 2002), last estimated in 1993. Historically, Guadalupe fur seals were
31 once prevalent from Point Conception south to the Revillagigedo Islands off Mexico.
32 Individuals have been reported at Santa Barbara, San Nicolas and San Miguel Islands
33 in recent years, however. During 1997-1998, a female successfully weaned a pup at
34 San Miguel Island (Melin and DeLong 1999), the first pup reported in this region since
35 historic times. Guadalupe fur seals have been reported occasionally along the central
36 California coast. Strandings have also occurred throughout the SCB and central
37 California (Hanni *et al.* 1997). Only four Guadalupe fur seals have been taken in for
38 treatment at the Santa Barbara Marine Mammal Center between 1976 and 2002
39 (SBMMC, unpublished records, 1976-2002). The Santa Barbara Museum of Natural
40 History (SBMNH) has not reported any dead specimens over the same period (pers.
41 comm., Collins, SBMNH, 2002). No stock size is available for California waters, since

3.4 Marine Wildlife

only a few Guadalupe fur seals are likely to be present at any one time. The chances of this species appearing at the project site are extremely remote.

SOUTHERN SEA OTTER (*ENHYDRA LUTRIS NEREIS*)

The southern sea otter is listed as threatened under the federal ESA and is considered depleted and strategic under the MMPA. In general, the California population has been steadily increasing since the discovery of a remnant colony off Bixby Creek in central California in 1937. Some declines have occurred following El Niño events, however (U.S. Geological Survey [USGS] 1999 and 2001). The following summarizes population trends over the past five years, based on USGS censuses (USGS 2003):

| | |
|--------|-------|
| • 1998 | 2,114 |
| • 1999 | 2,090 |
| • 2000 | 2,317 |
| • 2001 | 2,161 |
| • 2002 | 2,139 |
| • 2003 | 2,505 |

The data suggest a gradual but statistically significant population increase of about 0.9% a year since 1998, although the latest count, conducted in good observation conditions, may have skewed the data (USGS 2003). Based on the average, recent concerns regarding apparent declines may be less significant.

The California stock of sea otters ranges from Point Conception north to Año Nuevo Island, in Santa Cruz County. This population is concentrated near the coast in waters up to about 20 meters deep, although some otters can be found out to about 40 meters of water depth. Few otters have been sighted north of Año Nuevo Island, where the northward spread seems to have stopped. Predation by great white sharks (*Carcharodon carcharias*) likely has contributed to the cessation of range expansion to the north (Ames and Morejohn 1980). Otters have been steadily spreading to the south over the past several decades, however. In the spring of 1998, 102 otters moved into the beds of giant kelp just east of Point Conception. The following spring, 152 otters moved into the same area. Most were believed to be subadult males. This process was not repeated in 2000. In 2001, 58 sea otters moved into the same area. Both sexes and various age groups were represented (pers. comm., Hyatt, Research Vessel Spirit, 2001). Up to 18 otters have been sighted off the northwest end of San Miguel Island in recent years (Howorth, SBMMC, unpublished field notes 1965-2001; pers. comm., Sanders, USFWS, 2000). Otters have been sighted at several other Channel Islands. From 1987 to 1990, the USFWS, which has jurisdiction over sea otters, translocated 139 otters to San Nicolas Island. The translocation effort has not been considered a success. Recently, up to 17 animals have been reported there. Whether these animals are part of the translocated stock, offspring from the translocated stock, others that have moved there, or a combination of these possibilities, is unknown.

Sea otters have also been sporadically observed along the mainland coast south of Point Conception, but their presence south of Gaviota is rare. One sea otter was observed during the Mobil Seacliff Pier decommissioning project in 1998. It was off Pitas Point, about 2.5 miles southeast of the Mobil project site (Howorth 1998a). Interestingly, the southernmost sighting of a sea otter was at Isla Magdalena, Baja California, which was farther south than sea otters were reported historically (Rodriguez-Jaramillo and Gendron 1996). Their presence at the shell mound project site is extremely unlikely, particularly since the depth at the site is near the limit of their diving capabilities and far more productive feeding grounds exist in nearby shallow areas. Moreover, they are rare in the immediate area. No sea otters were observed in the area during the 4H Project or Chevron proprietary studies (Howorth 1996 and 1998b).

3.4.1.2 Sea Turtles

Taxa in or Near the Project Area

Four species of the order *Testudines* – turtles – have been reported in the northeastern Pacific (NMFS and USFWS 1998a-d). Three are members of the family *Cheloniidae*, while the fourth is the only living member of the family *Dermochelyidae*.

This section provides an introduction and summary of the utilization of the region by sea turtles. No sea turtles were observed during the 4H Project or Chevron's proprietary studies (Howorth 1996 and 1998b), nor have any been reported during similar projects in the region.

Threatened and Endangered Species of Sea Turtles

Three cheloniid sea turtles are listed as threatened under the ESA, while the leatherback, a dermochelyid, is endangered. No critical habitat has been established for these species. No other species occur in the region. The occurrence of these species is summarized in Table 3.4-4 and discussed in the species accounts that follow.

In the eastern North Pacific, sea turtles generally frequent tropical and subtropical waters, although occasional sightings or strandings have been made as far north as Alaska, especially during El Niño events. Sea turtle sightings at or near the project site have been extremely rare. Since all four species that have been reported in the SCB are threatened or endangered, however, each is discussed in some detail. The level of detail provided for listed species is necessary because sea turtles, like marine mammals and other organisms with air or gas-filled cavities in their bodies, can be susceptible to the effects of underwater detonations, which may be necessary to demolish the Platform Hazel caissons. An assessment of the likelihood of each species appearing at or near the project site is included.

LOGGERHEAD SEA TURTLE (*CARETTA CARETTA*)

The loggerhead sea turtle is listed as threatened under the federal ESA. The population appears to be continuing to decline (NMFS and USFWS 1998c).

Table 3.4-4. Occurrence of Threatened and Endangered Species of Sea Turtles in or near the Project Site

| <i>Species</i> | <i>Status</i> | <i>Stock size</i> | <i>Occurrence in SCB</i> | <i>Reported near Project Site*</i> | <i>Potential Occurrence</i> |
|--|---------------|-------------------|--------------------------|------------------------------------|-----------------------------|
| Loggerhead sea turtle | Threatened | Not available | Rare | No | Extremely remote |
| Green sea turtle | Threatened | Not available | Rare | No | Extremely remote |
| Olive Ridley sea turtle | Threatened | Not available | Rare | No | Extremely remote |
| Leatherback sea turtle | Endangered | Not available | Uncommon but offshore | No | Extremely remote |
| * Within 4 nmi Sources: NMFS and USFWS 1998a-d; NOAA 2000b. | | | | | |

1 Loggerheads occur worldwide in tropical to temperate waters. Although they are rare
 2 off California, they have been reported from Alaska to Chile. They do not appear to
 3 nest in the eastern or central Pacific. Most loggerhead sightings were reported off Baja
 4 California, and the largest concentrations have been off Bahia Magdalena. Strandings
 5 and sightings along the west coast have mainly been in southern California, although a
 6 few sightings were reported off Washington (Hodge 1982). Interestingly, the only
 7 sighting reported near the project site occurred in 1983, when a juvenile loggerhead
 8 stranded alive off Summerland (Stinson 1984).

9 Juvenile loggerheads have been reported year-round off southern California (Guess
 10 1981a and b; Stinson 1984). These may represent the northern range limits of a much
 11 larger population of juveniles that is present off the west coast of Baja California (Pitman
 12 1990). In California, both adults and juveniles are most often seen from July through
 13 September (Stinson 1984), although in general, sightings are not common. In fact,
 14 adults are rarely seen. Sightings of adults have been reported in as much as 1000
 15 meters of water. In general, sightings are more frequent during El Niño events,
 16 reflecting the general preference that cheloniids have for warmer waters.

17 No sightings of loggerhead sea turtles were reported during extensive marine mammal
 18 surveys conducted from 1975 to 1993 (Bonnell et al. 1981; Dohl et al. 1981; Hill and
 19 Barlow 1992; Carretta and Forney 1993; Mangels and Gerrodette 1994; Carretta et al.
 20 2000 and 2001; Barlow and Taylor 2001). The chances of any loggerhead sea turtles
 21 appearing at or near the project site are extremely remote.

22 GREEN SEA TURTLE (*CHELONIA MYDAS*)

23 The green sea turtle is considered threatened under the federal ESA, while the Mexican
 24 breeding population is endangered. The population has been in a severe decline over

the past 30 years. The decline occurred between 1950 and 1970, when wintering green sea turtles in the Gulf of California were drastically over-harvested. Egg harvests on the mainland coast of Mexico from 1960 to 1980 caused a continued decline.

The taxonomy of the green sea turtle is controversial, with some authorities considering the eastern Pacific population to be the black sea turtle (*Chelonia agassizi*). Others have referred to it as a subspecies, *Chelonia mydas agassizi*, or the eastern Pacific green sea turtle. The "Pacific green sea turtle" has been referred to as *Chelonia mydas mydas*. Both cheloniids are sometimes called "green/black sea turtles." In recovery plans and status reviews, however, the eastern Pacific green sea turtle is called *Chelonia mydas*, so this document follows this convention (Plotkin 1995; NMFS and USFWS 1998a).

The normal range of the eastern Pacific green sea turtle is from Baja California to Peru and out to the Galapagos Islands. However, green sea turtles have been reported as far north as British Columbia. In 1993, a green sea turtle stranded at Homer, Alaska, and in 1996, another was recovered from Prince William Sound, Alaska (NMFS and USFWS 1998a). Green sea turtles, like other cheloniids, prefer tropical to warm temperate waters. South of Point Conception, they are most often seen from July through October regardless of water temperatures (Stinson 1984). North of the point, they appear most frequently during El Niño events. Many sightings of eastern Pacific green sea turtles have been in eelgrass beds.

Juveniles have been reported offshore in Southern California (NMFS and USFWS 1998a), while adults have been reported in coastal waters less than 50 meters deep (Stinson 1984). No green sea turtles have been reported at or near the project site (Stinson 1984). No sightings of green sea turtles were reported during extensive marine mammal surveys conducted between 1975 and 1993 (Bonnell et al. 1981; Dohl et al. 1981; Hill and Barlow 1992; Carretta and Forney 1993; Mangels and Gerrodette 1994; Carretta et al. 2000 and 2001; Barlow and Taylor 2001). The chances of any green sea turtles appearing at or near the project site are extremely remote.

OLIVE RIDLEY SEA TURTLE (*LEPODOCHELYS OLIVACEA*)

The eastern Pacific population of olive ridley sea turtle is listed as threatened under the federal ESA. The stock is declining, even though the olive ridley is considered the most abundant sea turtle in the world. Clifton et al. (1982) estimated that the olive ridley population off the Pacific coast of Mexico numbered over 10,000,000. Yet in 1968 alone, however, over 1,000,000 olive ridleys were harvested in Mexico (Carr 1972). The Mexico breeding population is now listed as endangered.

The olive ridley sea turtle is found around the world in tropical to temperate waters. The usual range of the eastern Pacific olive ridley is from Baja California to Peru, usually within 1200 nm of shore (NMFS and USFWS 1998b). Stinson (1984) considered this species rare off Southern California. Juveniles have been reported offshore, while most sightings of adults and subadults have been in water less than 50 meters deep off the coast. During the period 1982 through 1993, ten strandings were reported in California.

3.4 Marine Wildlife

1 In 1996, an olive ridley stranded at Goleta Beach State Park, near Santa Barbara
2 (SBMMC, unpublished records 1976-2001). Olive ridleys are most likely to be
3 encountered during the warmest months.

4 No sightings of olive ridley sea turtles were reported during extensive marine mammal
5 surveys conducted between 1975 and 1999 (Bonnell et al. 1981; Dohl et al. 1981; Hill
6 and Barlow 1992; Carretta and Forney 1993; Mangels and Gerrodette 1994; Carretta et
7 al. 1993 and 1994; Barlow and Taylor 2001). Considering the rarity of this species in
8 the SCB, the chances of it appearing at or near the project site are extremely remote.

9 LEATHERBACK SEA TURTLE (*DERMOCHELYS CORIACEA*)

10 The leatherback sea turtle is the only living representative of the family Dermochelyidae.
11 It is considered endangered under the federal ESA. Its stocks are declining (NMFS
12 2000b). Nearly half of the world's population of leatherbacks once nested along the
13 west coast of Mexico. Eggs as well as adult females were harvested in huge numbers.

14 In the eastern Pacific, the leatherback sea turtle is found mainly along the slope from
15 Chile to Alaska, generally over water 200 to 1,500 meters deep. The leatherback is the
16 most frequently seen sea turtle off California (Stinson 1984), although no stock or
17 population estimates are currently available (NMFS and USFWS 1998d). Leatherbacks
18 are most prevalent from July through September. They usually appear when water
19 temperatures range from 18 to 20 degrees C.

20 From 1986 to 1991, 96 sightings were reported off Monterey Bay. Leatherback sea
21 turtle strandings numbered 50 out of 104 between 1982 and 1991.

22 Only four sightings of leatherback sea turtles were reported during extensive marine
23 mammal surveys conducted between 1975 and 1993 (Bonnell et al. 1981; Dohl et al.
24 1981; Hill and Barlow 1992; Carretta and Forney 1993; Carretta et al. 2000 and 2001;
25 Barlow and Taylor 2001). Leatherbacks are not likely to be encountered at the project
26 site because of their propensity for the deeper waters of the continental slope. In the
27 Santa Barbara Channel, one leatherback was rescued in 1995 about 1 nm off Santa
28 Barbara. It had become entangled in a crab trap buoy line (SBMMC, unpublished
29 records 1976-2002). Another was observed north of Santa Cruz Island in 1998.
30 Interestingly, still another was observed feeding on krill off Santa Rosa Island in 2000,
31 along with blue sharks (*Prionace glauca*), basking sharks (*Cetorhinus maximus*),
32 humpback whales (*Megaptera novaeangliae*), and blue whales (*Balaenoptera*
33 *musculus*; Howorth, SBMMC, unpublished field notes 1965-2002). Considering the
34 overall scarcity of this species, however, the chances of any leatherbacks appearing at
35 or near the project site are extremely remote.

36 **3.4.1.3 Seabirds**

37 *Taxa in or Near the Project Area*

38 In all, some 195 species of seabirds occur along the mainland coast, in the Santa
39 Barbara Channel and at the Channel Islands (Baird 1993). The abundance and

diversity fluctuates seasonally because most species are transients traveling the Pacific flyway. The following list summarizes several families and subfamilies of seabirds, particularly diving birds, that occur at or near the project site regularly, seasonally or sporadically:

- Family Gaviidae: loons,
- Family Podicipedidae: grebes,
- Family Procellariidae: shearwaters, petrels and the northern fulmar (*Fulmaris glacialis*),
- Family Phalacrocoracidae: cormorants,
- Subfamily Aythyinae: diving ducks and the surf scoter (*Melanitta perspicillata*),
- Family Alcidae: murre, murrelets, auklets, puffins and the pigeon guillemot (*Cephus columba*), and
- Family Laridae: gulls and terns.
- Other families and subfamilies of seabirds and shore birds exist in the SCB. None of the others that occur at or near the project site are listed, however, nor are they diving birds. All of the families summarized above include species that dive. Some, like loons, grebes and cormorants, can dive to considerable depths by using their feet as paddles. Shearwaters and the northern fulmar, use both their feet and their wings to swim underwater several meters. Diving ducks and the surf scoter generally use their feet but may use their wings as well and can descend a few meters. Some alcids can dive to 60 meters or so, swimming underwater with their wings. A few, like gulls and terns, plunge briefly into the water, descending a very short distance, then bob back to the surface. The diving birds are summarized above because of the potential impacts of underwater detonations (see Section 3.4.4).

Species Observed during 4H Project

During the above Project, the most abundant seabirds were western gulls (*Larus occidentalis*) and California brown pelicans (*Pelecanus occidentalis californicus*). Other species included the double-crested cormorant (*Phalacrocorax auritus*), the sooty shearwater (*Puffinus griseus*), the northern phalarope (*Lobipes labatus*), and the northern fulmar (*Fulmaris glacialis*). No injuries or mortalities of seabirds resulted from the detonations.

Special Status Species

Most seabirds are protected under the federal Migratory Bird Treaty Act. In addition, some species, such as the California least tern, California brown pelican and the light-footed clapper rail, are also fully protected under California law. In addition, a few species are classified as California Species of Special Concern. Some of these species that may occur at or near the project site are listed below:

- Double-crested cormorant (*Phalacrocorax auritus*),

- Elegant tern (*Sterna elegans*),
- Western snowy plover (*Charadrius alexandrinus nivosus*),
- Long-billed curlew (*Numenius americanus*),
- California gull (*Larus californicus*),
- Common loon (*Gavia immer*),
- Ashy storm petrel (*Oceanodroma homochroa*),
- Black storm petrel (*Oceanodroma melania*), and
- Rhinoceros auklet (*Cerorhinca monocerata*).

Threatened and Endangered Species of Seabirds

Five species of birds found at or near the ocean are federally listed as threatened or endangered. These include the California brown pelican (*Pelecanus occidentalis californicus*), the marbled murrelet (*Brachyramphus marmoratus marmoratus*), the California least tern (*Sterna albifrons browni*), the western snowy plover (*Charadrius alexandrinus nivosus*), and the light-footed clapper rail (*Rallus longirostris levipes*). Xantus' murrelet (*Synthliboramphus hypoleucus*) was declared a threatened species by the State of California in November 2002 and is a candidate for federal listing. The occurrence of listed species of seabirds is summarized in Table 3.4-5 and discussed in the species accounts that follow.

Table 3.4-5. Occurrence of Threatened and Endangered Species of Birds in or near the Project Site

| Species | Status | Stock size | Occurrence in SCB | Reported near Project Site* | Potential Occurrence |
|---------------------------|-----------------|------------------|----------------------------|-----------------------------|---------------------------|
| California brown pelican | Endangered | 6,050 nest tries | Common | Common | Likely |
| Marbled murrelet | Threatened | 6,000 | Uncommon and only seasonal | No | Possible nearshore |
| California least tern | Endangered | 3,493-3,711 prs. | April through September | No | Possible; low numbers |
| Western snowy plover | Threatened | 2,000 prs. | Uncommon | No | Extremely remote offshore |
| Light-footed clapper rail | Endangered | | Uncommon | No | Extremely remote offshore |
| Xantus' murrelet | Threatened (CA) | <5,000 prs. | Common | No | Possible |

* Within 4 nmi

Sources: USFWS 1980, 1983, 1997 and 2001; Keane 2000; MMS 2001.

An assessment of the likelihood of each threatened or endangered species appearing at or near the project site is provided in Table 3.4-5. All federally listed threatened and endangered species that have been reported offshore in the SCB are discussed in detail because any take would be considered significant. The light-footed clapper rail occurs only in estuaries and mudflats and does not venture offshore, so it will not be discussed further in this document. The western snowy plover nests on sandy beaches, and forages on sandy shores and flats. Part of its critical habitat includes Carpinteria Beach, Point Castillo and Santa Barbara harbor beach, all of which lie within a few miles of the project site (MMS 2001). It does not venture offshore, however, so it will not be discussed further in this document.

CALIFORNIA BROWN PELICAN (*PELECANUS OCCIDENTALIS CALIFORNICUS*)

The California brown pelican, one of six subspecies of a more widely distributed species, is federally listed as endangered. The population experienced widespread reproductive failure as a consequence of DDT and its derivative, DDE, entering the marine food web in the 1960s. No critical habitat has been established for this species (USFWS 1983; MMS 2001).

The number of nesting attempts at the Channel Islands has varied widely over recent years. The following compares the numbers of nesting attempts at West Anacapa and Santa Barbara Island during 1998 and 1999:

| <u>Year</u> | <u>West Anacapa Island</u> | <u>Santa Barbara Island</u> |
|-------------|----------------------------|-----------------------------|
| 1998 | 2,500 | 450 |
| 1999 | 5,300 | 750 |

Breeding colonies of California brown pelicans have ranged from as far north as Point Lobos, in Monterey, California, through Baja California to islands off Nayarit and Acapulco, off mainland Mexico. The main breeding colonies are in the Gulf of California and on the Tres Marias Islands off Nayarit. In southern California, they only nest on Anacapa and Santa Barbara Islands, although they once nested at several other California sites (MMS 2001).

In the Channel Islands, California brown pelicans breed from March through early August, although some breeding can occur as early as January (MMS 2001). Fledging usually occurs at about 13 weeks (USFWS 1983; Cogswell 1977). As early as May, large numbers of brown pelicans from Mexico, which have an earlier breeding season, appear off California. Pelicans generally appear north of Point Conception in July. From December through March, all but 500 pairs or so have left the northern area. California brown pelicans can venture as far north as British Columbia in late summer and early fall. They fly south as far as northwestern Mexico (MMS 2001). Brown pelicans are abundant in the Santa Barbara Channel year-round, thus it is likely they will appear at or near the project site.

Brown pelicans roam throughout the channel in quest of food. Along other parts of the coast, they usually forage within 11 nm of shore. They catch their prey by diving from a height of 6 to 12 meters into the sea, opening their expandable pouch, then bobbing

3.4 Marine Wildlife

1 rapidly to the surface to purge the pouch of water and swallow their prey. Prey consists
2 mainly of northern anchovies (*Engraulis mordax*). Other prey include the Pacific sardine
3 (*Sardinops sagax caeruleus*) and Pacific mackerel (*Scomber japonicus*).

4 Feeding pelicans are often accompanied by scavenging gulls.

5 MARBLED MURRELET (*BRACHYRAMPHUS MARMORATUS MARMORATUS*)

6 The marbled murrelet is federally listed as threatened. It is considered endangered by
7 the State of California. The population has been declining over the past decade, mainly
8 from the effects of deforestation in California and in the Pacific Northwest. (The
9 marbled murrelet relies upon old-growth forests for nesting habitat.) In California,
10 critical habitat for this species comprises various inland old-growth forests from Santa
11 Cruz County north. Other factors contributing to the decline of this species include net
12 fisheries and oil spills from all types of boats and marine vessels (USFWS 1997).

13 The latest population estimates vary from 1,650 to 2,000 breeding birds in California, or
14 a total State population of 6,000 birds. Historically, the total population may have been
15 10 times that (USFWS 1997).

16 Marbled murrelets range along the eastern North Pacific coast from Alaska to California.
17 The southern part of their breeding range is in central California. Most nests are built
18 within 50 miles (80 kilometers) of the coast. Large trees in multistoried stands with
19 moderate to high canopy closure are the favored nesting habitat. Wintering birds have
20 been reported off the coast of southern California and northern Baja California, Mexico.
21 Marbled murrelets could possibly be present inshore from the project site in winter, but
22 not in large numbers. Marbled murrelets generally stay within 1 to 2 kilometers from
23 shore (USFWS 1997).

24 Marbled murrelets, like other alcids, are diving birds. They can descend to at least 27
25 meters of water depth, swimming with short wingbeats. Marbled murrelets prey on
26 small fish in nearshore waters. Prey includes a variety of fish, such as Pacific sand
27 lance (*Ammodytes hexapterus*), which appears to be the most important prey for chicks,
28 Pacific herring (*Clupea harengus pallasii*), northern anchovy (*Engraulis mordax*), shiner
29 surfperch (*Cymatogaster aggregata*) and smelts (*Osmeridae*). Pacific sardines
30 (*Sardinops sagax caeruleus*) were also reported as prey in the early 1900s.
31 Invertebrate prey includes euphausiid shrimp, mysids and gammarid amphipods
32 (USFWS 1997).

33 CALIFORNIA LEAST TERN (*STERNA ALBIFRONS BROWNII*)

34 The California least tern is listed as endangered under the federal and State
35 endangered species acts. Reasons for the decline of this species include loss of
36 nesting and feeding areas and high levels of human-related disturbances. In southern
37 California, most sandy beaches have been heavily used by humans and domestic pets,
38 which contributed to the decline of this species. Estuaries, which were once important
39 feeding grounds have been filled in or developed. Remaining estuaries are often

polluted, resulting in degradation or loss of feeding grounds (USFWS 1980). Nonetheless, critical habitat has not been established for this species.

Following more active management that began in the mid 1980s, the California least tern population appears to be steadily increasing, although it fluctuates from year to year. The number of nesting pairs has varied over the past few years, as shown below (Caffrey 1998; Keane 2000; pers. comm., Keane, cited in MMS 2001):

- 1996 3,330 to 3,392 pairs
- 1998 4,141 to 4,182 pairs
- 1999 3,493 to 3,711 pairs
- 2001 4,500 pairs
- 2002 3,511 to 3,626 pairs

The migration routes and winter distribution of the California least tern are poorly understood but probably extend from the southern coast of Mexico to Central America and possibly to South America on the Pacific side (MMS 2001). In late April, California least terns nest on sandy beaches in California, usually leaving in August or September. The closest nesting beaches to the project site are at the mouth of the Santa Clara River, Ormond Beach and Mugu Lagoon, all in Ventura County. Nesting sites in Santa Barbara County include the mouth of the Santa Ynez River, Purisima Point and the mouth of San Antonio Creek, all north of Point Conception. California least terns range from at San Francisco Bay, California, to San Jose del Cabo, Baja California, Mexico. California least terns could appear at or near the project site during the nesting season (April through September), though probably not in large numbers.

The California least tern population was estimated at 775 breeding pairs in 1977. It was once prolific in California, but no estimate of its former population is available (USFWS 1980). In 1998, 839 breeding California least terns were noted in central and southern California (Keane 2000).

California least terns feed primarily in estuaries and lagoons, although they also occasionally forage in the ocean up to 3 to 5 kilometers offshore (MMS 2001). They feed by hovering, then diving briefly into the water to snatch fish. Prey includes northern anchovy (*Engraulis mordax*), topsmelt (*Atherinops affinis*), various surfperch, killifish (*Fundulus parvipinnis*), mosquitofish (*Gambusia affinis*), and numerous other species.

XANTUS' MURRELET (*SYNTHLIBORAMPHUS HYPOLEUCUS*)

Xantus' murrelet was declared threatened by the State of California in November 2002. It is a candidate for federal listing. Reasons for its decline include predation by island foxes (*Urocyon littoralis*), feral cats, rats, and mice. Barn owls (*Tyto alba*), burrowing owls (*Speotyto cunicularia*) and western gulls (*Larus occidentalis*) are also known to prey on Xantus' murrelets (Thoresen 1992). Some predation of murrelets may occur when they are visible in the lights of boats anchored off island nesting sites. The

1 population appears to be declining and now stands at less than 5000 pairs (NOAA
2 2000).

3 Xantus' murrelets nest at Santa Barbara Island, about 65 nm south of Santa Barbara,
4 California and nearly 60 nm from the project site. They also nest on islands off the
5 northwest coast of Baja California, where their range overlaps that of Craveri's murrelet,
6 a closely related species. Nesting takes place in April and May. By early summer, the
7 chicks have fledged and take to sea with their parents. Xantus' murrelets range from
8 northwestern Baja California to at least Oregon (Thoresen 1992).

9 Xantus' murrelets feed at sea on small schooling fish, crustaceans and other planktonic
10 forms. Off the Oregon coast, they have been observed feeding on Pacific saury
11 (*Cololabis saira*). They feed while swimming on the surface and by diving (Thoresen
12 1992).

13 3.4.2 Regulatory Setting

14 All marine mammals are protected under the Marine Mammal Protection Act of 1972
15 (MMPA) and various amendments to the Act. This Act makes it illegal to "take" any
16 marine mammal. The MMPA defines take as "to harass, hunt, capture, or kill any
17 marine mammal." In amendments to the Act made in 1994, the term "harassment" was
18 divided into two levels. Level A harassment means "any act of pursuit, torment or
19 annoyance which has the potential to injure a marine mammal or a marine mammal
20 stock in the wild." Level B harassment means any act that has "the potential to disturb a
21 marine mammal or marine mammal stock in the wild by causing disruption of behavioral
22 patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or
23 sheltering" (MMPA 1972, amended 1994, 16 U.S.C., section 1431 et seq.).

24 Several stocks of endangered whales, including the California stocks of mysticetes
25 discussed above, are classified as strategic under the MMPA (Carretta et al. 2001).
26 The definition of strategic is very complex, but in this context it refers to a stock of
27 whales that is being negatively impacted by human activities and may not be
28 sustainable, thus it is of strategic importance at a regional or population level. In
29 addition, some species may be considered depleted, in which the population falls below
30 optimum sustainable levels. Most marine mammals and all sea turtles fall under the
31 jurisdiction of National Oceanic and Atmospheric Administration (NOAA) Fisheries
32 (formerly National Marine Fisheries Service or NMFS), U.S. Department of Commerce.
33 Technically, however, all marine mammals within State waters remain the property of
34 the state in which they occur, thus they are also under the jurisdiction of the California
35 Department of Fish and Game.

36 Within the study area, the only species of marine mammal not under the jurisdiction of
37 NOAA Fisheries are sea otters, which are under the jurisdiction of the U.S. Fish and
38 Wildlife Service (USFWS), Department of the Interior. Sea otters are still protected
39 under the MMPA, however (see above).

1 Some species of marine mammals and all sea turtles fall under the protection of the
2 federal Endangered Species Act of 1973 (ESA). A few species of seabirds, which are
3 under the jurisdiction of the USFWS, also are protected by the ESA. Under this Act,
4 animals can be listed as threatened, which means likely to become endangered, or
5 endangered, which means likely to become extinct. Also, some species may be
6 proposed as candidates for listing as either threatened or endangered under the Act.
7 Threatened species can be shifted to endangered status if necessary, while
8 endangered species can be downlisted to threatened status or removed from the
9 Endangered Species List entirely. Threatened species can also be delisted. The State
10 of California also has an Endangered Species Act similar to the federal ESA. In some
11 cases, the same species may be listed under both Acts.

12 No critical habitat has been established for any of the threatened and endangered
13 marine mammal and sea turtle species in the SCB, thus no critical habitat for these
14 species would be affected by project activities.

15 Critical habitat has been established for the western snowy plover and the marbled
16 murrelet (USFWS 1997; MMS 2001). The former includes some beaches near the
17 project site, while the latter includes old-growth forests from Santa Cruz County north
18 (see Section 3.3.3.3 for details).

19 Most seabirds are protected under the federal Migratory Bird Treaty Act, which is
20 enforced by the U.S. Fish and Wildlife Service. In addition, some species are also
21 protected under California law. Finally, a few species are classified as California
22 Species of Special Concern (see Section 3.4.1.3 for details).

23 **3.4.3 Significance Criteria**

24 An assessment was made of the short- and long-term impacts of Program Alternatives,
25 as well as of the direct and indirect impacts. Significant impacts are defined as follows:

- 26 • Any impacts that had substantial, long-term biological effects on a population;
- 27 • Any impacts that resulted in injury, mortality or what could be considered a Level
28 A take under the MMPA;
- 29 • Any impact that exposed a marine mammal or sea turtle to contaminants that
30 could cause acute toxicity or bioaccumulation;
- 31 • Any impacts involving a take of a threatened or endangered species; and
- 32 • Any impacts resulting in injuries or mortalities to substantial numbers (e.g., more
33 than 10) of seabirds.

34 **3.4.4 Impacts and Mitigation Measures**

35 The potential for significant impacts to marine wildlife varies for each of the Program
36 Alternatives. The most significant potential impacts are associated with the use of
37 explosives in removing the Hazel caissons. Other potentially significant impacts are

1 associated with disturbing the shell mound sediments, either to remove or spread them.
2 The shell mound sediments contain substances that could be toxic to marine wildlife or
3 that could bioaccumulate in marine wildlife. Although PA6 and the No Project
4 Alternative do not involve disturbing the shell mound sediments, leaving them in place
5 also poses some potentially adverse impacts. Finally, some operational aspects of
6 removing or spreading the shell mounds and/or removing the caissons present potential
7 impacts.

8 The following sections address the potential impacts to marine wildlife with each
9 Program Alternative, present mitigation measures designed to reduce potentially
10 significant impacts to less than significant levels, and discuss the residual impacts after
11 the mitigation measures have been implemented.

12 **3.4.4.1 Program Alternative 1 (PA1): Shell Mounds and Caissons Removal and** 13 **Disposal**

14 This Program Alternative involves the removal and disposal of the shell mounds and
15 associated contaminants, as well as the demolition and removal of the Hazel caissons.

16 Removing the Hazel caissons involves the use of explosives. NOAA Fisheries has
17 expressed concerns about the effects of increasing anthropogenic noise upon marine
18 mammals. Of particular concern are loud impulse sounds such as those generated by
19 underwater explosives. Such sounds can result in impacts ranging from Level B
20 harassment under the MMPA (Class II or III, depending on whether listed species are
21 involved) to serious injuries or mortalities (Class II). Chronic, persistent sounds can
22 mask the ability of marine mammals to detect predators and prey and to communicate,
23 resulting in significant impacts. In the case of odontocetes, such sounds can also affect
24 their ability to echolocate prey. Persistent anthropogenic sounds may also deter marine
25 mammals from feeding grounds or migration paths.

26 Before discussing the potential impacts of underwater explosives, it is first necessary to
27 understand some of the principles of underwater sound.

28 *Sound Level Measurements*

29 It is important to understand what sound level measurements actually represent when
30 applying such measurements to mitigation. The intensity of sound is expressed in
31 decibels (dB), which provide a measure of the magnitude of sound. Decibels do *not*
32 form a linear progression, meaning that 200 decibels would be twice as loud as 100.
33 Instead, they are based on a logarithmic scale something like the Richter scale for
34 earthquakes. A doubling in sound intensity is indicated by a 3 dB increase, regardless
35 of the level of the original sound. For example, a dB level of 63 is twice as loud as 60
36 dB and a dB level of 180 is twice as loud as 177 dB. For every 10 dB increase, the
37 intensity increases ten times. Thus, 210 dB is twice as loud as 200 dB and 220 db is
38 100 times as loud as 200 dB.

39 For decibels to have relevance, they must be referenced to pressure. A micropascal
40 (μPa) is a measurement of pressure equal to one-millionth of a pascal. (One pascal

represents a 1-newton force exerted over 1 square meter.) The reference pressure used for underwater sounds is 1 μPa . (In air, the reference pressure is 20 μPa , rendering decibel comparisons of familiar airborne sounds, such as rock bands and jet engines, of no relevance to underwater sounds.) Thus, underwater sound pressure level measurements are expressed as X dB re 1 μPa , which provides a measure of the magnitude of sound referenced to pressure. For many years, any sound pressure levels of 180 dB re 1 μPa or above were thought to have the potential of causing harm to marine mammals.

Sound pressure measurements can also be expressed as X dB re 1 $\mu\text{Pa}\cdot\text{m}$, which represents the theoretical sound pressure level within 1 meter of the source. This is often referred to as the source level. The reference distance of 1 meter is included so that a measured or modeled level at a given distance (e.g., 100 meters) can be compared to the level at the source itself. This is useful in assessing at what range sound pressure levels fall to levels considered safe for marine mammals. Source levels were modeled for the demolition of the Hazel caissons so that safe ranges for marine mammals could be projected (see Appendix D).

Accepted Sound Pressure Levels

Although various sound pressure levels have been accepted by the regulatory agencies as being safe for marine mammals and sea turtles during a number of recent projects involving impulse sounds, no standards have been formally adopted. New standards may be adopted soon, however (pers. comm., T. Fahy, NOAA Fisheries, 2003)

In projects in this region involving underwater detonations, 180 dB re 1 μPa has been used as the peak sound pressure level that can be received by marine mammals without injury (Howorth 1996; 1997a and b; 1998a). More recently, 182 dB re 1 $\mu\text{Pa}^2\cdot\text{s}$ was applied to establishing hazard zones for marine mammals during the ship shock trials of the submarine *U.S.S. Seawolf* (U.S. Navy 1998). This measurement has been applied to subsequent projects pending adoption of new standards by NOAA Fisheries. This measurement represents the *energy* of pulsed sounds. Energy is proportional to the length of time that sound pressure is applied, expressed in micropascals squared over a period of 1 second ($\mu\text{Pa}^2\cdot\text{s}$). In this application, the measurement refers to the maximum amount of sound energy that can be received by a marine mammal without injury.

Another measurement was also used in establishing hazard zones for marine mammals for the *U.S.S. Seawolf* project: 12 psi-millisecond impulse pressure (U.S. Navy 1998). This amounts to the maximum overpressure that can be received from an impulse sound by a marine mammal without injury. Whichever measurement attained the greatest range before reaching its threshold was applied to the wildlife hazard zone for that project.

Still another measure of sound pulse amplitudes is the root-mean-square (rms) pressure level, which is averaged over the duration of the pulse. This represents the average peak pressure and is expressed as X dB re 1 $\mu\text{Pa}\cdot\text{rms}$. During a project

1 involving geophysical airguns, an average peak pressure level of 160 dB re 1 μ Pa-rms
2 was used to establish a hazard zone for baleen whales and the sperm whale, while 180
3 dB re 1 μ Pa-rms was used for pinnipeds and small cetaceans (Howorth 1998c). The
4 split values were used because it was assumed that baleen whales and the sperm
5 whale, because of their hearing sensitivities, would be affected by lower decibel sounds.

6 Relatively few studies have been conducted on safe sound pressure levels for seabirds,
7 especially diving birds. One study, however, suggested that diving birds subjected to
8 impulse levels of more than 45 psi-millisecond would suffer heavy losses. The mortality
9 threshold, at which only 10 percent were expected to be lost, was 36 psi-millisecond.
10 Below 20 psi-millisecond, 50 percent of the birds could suffer from slight lung injuries or
11 tympanic membrane ruptures, but were expected to survive. In general, diving seabirds
12 are considerably more vulnerable to the concussive effects of underwater detonations
13 because of their comparatively small body sizes (Yelverton et al. 1973).

14 Conversely, however, birds on the sea surface are expected to be much more resilient.
15 Only a small part of their bodies would be exposed to an underwater sound pressure
16 wave, and much of this would be reflected. Also, sound pressure levels near the
17 surface from undersea detonations are usually lower. A mortality threshold for birds
18 swimming on the surface was estimated at 100 to 120 psi-millisecond, while the safe
19 threshold was considered to be 30 psi-millisecond (Yelverton et al. 1973.).

20 *Establishing Wildlife Hazard Zones during the Use of Explosives*

21 Contradictory terminology has been used to identify zones for the protection of marine
22 wildlife in numerous past projects. To clarify this matter, we define the zones below:

- 23 • *Hazard zone*: This is a zone in which minor to severe injuries can occur to
24 marine wildlife. In some projects, this has been called a safety zone, which can
25 be misleading. A hazard zone can also be designed to avoid harassment
26 impacts.
- 27 • *Buffer zone*: This is a zone in which animals are approaching the hazard zone
28 and may enter very soon. In a sense, this is an alert zone, in which animals can
29 be observed to make certain they do not enter the hazard zone. Buffer zones
30 are generally used for projects involving large amounts of explosives, such as
31 U.S. Navy ship shock trials. The presence of animals in a buffer zone does not
32 always preclude firing the charges; it simply serves as an early warning zone.
33 For the purposes of the project site, the line transect survey areas discussed
34 under the mitigation measures discussed later will serve as buffer zones.
- 35 • *Vessel exclusion zone or vessel hazard zone*: This is a zone to which any
36 vessels the demolition supervisor chooses to designate shall retire immediately
37 prior to a detonation. This is for the safety of the vessels and their crews. A
38 broader vessel safety or vessel exclusion zone can be designated for vessels not
39 engaged in project site activities.

The size of marine mammal hazard zones appears to be based on successful past projects, the current state of knowledge on the hearing sensitivities of marine mammals, the best estimates of safe sound pressure levels, modeled estimates of the distance within which sound pressure levels are safe, and the effects (if any) of past projects on marine life. Various hazard zones have been utilized in past projects in the region.

For many years, a 3,000-foot marine mammal hazard zone had been required for numerous oil platform decommissioning projects involving the use of explosive charges. The 3,000-foot zone was required during the 4H Project and wellhead removal project as well as during numerous decommissioning projects in the Gulf of Mexico. No impacts on marine mammals were observed during any of these operations (Howorth 1996; 1997a and b; pers. comm., Lecky, NOAA, 1996). During the 4H Project, actual sound level measurements were obtained during some of the detonations as part of a proprietary study conducted for Chevron U.S.A. Production Company (Greene et al. 1998). The measurements are provided, with Chevron's permission, in Table 3.4-6.

At present, NOAA Fisheries accepts 182 dB re 1 μ Pa²-s as the highest sound energy level that can be received by a marine mammal without injury. The 12 psi-ms level is also used. Any levels that fall below these thresholds (e.g., 175 dB re 1 μ Pa²-S) are considered safe for marine mammals. The method in which these threshold levels are applied is that the greatest range at which either of these levels is attained forms the basis for the hazard zone. Anything beyond that range is presumably safe. Some margin is allowed for additional safety (pers. comm., Fahy, NOAA, 2002). The measurements presented in Table 3.4-6 validate the effectiveness of the 3,000-foot hazard zone employed during the 4H Project. These measurements also provide examples of how the different threshold values are reached at various distances.

Table 3.4-6. Received Sound Pressure Levels during Chevron 4H Decommissioning

| <i>Range</i> | <i>Duration (seconds)</i> | <i>Energy (dB re 1 μPa²-s)</i> | <i>SPL (rms) (dB re 1 μPa)</i> | <i>Peak SPL (dB re 1 μPa)</i> |
|--|-------------------------------|--|---|--|
| 48' (15 m) | 0.141 | 213 | 222 | 240 |
| 89' (27 m) | 0.126 | 214 | 223 | 238 |
| 141' (43 m) | 0.136 | 205 | 215 | 229 |
| 279' (85 m) | 0.134 | 203 | 212 | 226 |
| 1017' (310 m) | 0.114 | 189 | 199 | 212 |
| 1575' (480 m) | 0.643 | 172 | 174 | 186 |
| 2625' (800m) | 2.931 | 180 | 175 | 187 |
| 2887' (880 m) | 0.769 | 168 | 169 | 182 |
| 4265' (1300 m) | 1.15 | 157 | 156 | 168 |
| Source: Greene et al. 1998, courtesy of Chevron. | | | | |

During the explosive demolition of a riser platform used to install part of a large sewage outfall off San Diego, a 1250-foot hazard zone was required because small charges

were used (Howorth 1997b). Like the project site, this one was in relatively deep water. No impacts on marine mammals were observed during this operation.

A more recent project involved the decommissioning of the Mobil Seacliff Pier Complex northwest of Ventura, California. Unlike the previously mentioned projects, this operation took place in shallow water, and considerably more explosives were used than had been employed in the previous projects. The amount of explosives varied from 88.5 to 594.6 pounds per caisson, detonated in series a few milliseconds apart (Howorth 1998a). By contrast, 45-pound charges, timed to detonate nearly one second apart, were used to sever the pilings during the 4H Project (Howorth 1996).

To allow for the heavier charges used during the Mobil project, a 6,000-foot marine mammal hazard zone was implemented, along with several other voluntary protection measures. When sound pressure levels were detected that were higher than expected, the hazard zone was voluntarily expanded to 9,000 feet and additional protection measures were implemented. No impacts were observed to marine mammals during the course of the project, which involved the demolition of 21 large, steel-reinforced concrete caissons (Howorth 1998a).

The Platform Hazel caissons, though large, are mostly filled with sand (Standard Oil Company of California, Western Operations, Inc. [Standard] 1957; Chevron Environmental Management Company 2001). The amount of concrete to be demolished is small compared to the amount in the Mobil Seacliff Pier caissons, which were solid concrete and steel. Consequently, the amount of explosives and the sizes of the individual charges needed to demolish the concrete in the Platform Hazel caissons are proportionately smaller.

Sound Frequencies

Understanding the frequencies of sounds that detonations produce is helpful in assessing potential harassment impacts on marine mammals. Various species of marine mammals hear sounds in given ranges of frequencies. When sounds produced by detonations fall within their range of hearing, a potential for harassment exists. If a sound is loud enough, even though it is outside the hearing frequency range, it can still be detected by a marine mammal and can even cause injury if it is extremely loud.

The range of sound produced by a detonation can be measured in hertz (Hz) and kilohertz (kHz). Hertz is a measure of sound frequency in cycles per second (one hertz equals one cycle per second). The lower the number, the lower the sound. One kilohertz equals 1,000 hertz. To relate these frequencies with hearing, consider that humans with very good hearing generally can hear sounds as low as 20 Hz and as high as 20 kHz.

When an underwater detonation occurs, energy in the form of sound is produced, along with a concussive force. The sound spectrum—the frequency range of sound—produced by a detonation is very broad near the detonation site. As the distance from the source increases, high frequency sounds fall off from absorption and scattering.

Conversely, low frequency sounds in the open ocean can travel considerable distances because little stands in their way except water, which is virtually incompressible. When sound channels created by undersea canyons and/or seafloor materials that reflect sound with little attenuation are present, such sounds sometimes travel remarkable distances, although they are greatly subdued and are not harmful at long ranges.

The most pervasive sounds from underwater detonations in deep, open-ocean water are quite low in frequency, generally peaking at about 15 Hz (Richardson et al. 1995). This is where sound levels peaked during the 4H Project (Greene et al. 1998). During the Mobil Seaciff Pier Decommissioning Project, however, which was in much shallower water, low frequency sounds ranged from 25 to 800 Hz, with an average of 269 Hz (Howorth 1998a). Reflection likely accounted for the fall-off of the very low frequency sounds.

Although low frequency sounds are certainly of concern for PA1, PA2, and PA5a, they will attenuate rapidly because a considerable amount of sound energy will be absorbed in the process of shattering the concrete (see Section 2.2.2). (The sound pressure levels at various distances from the Platform Hazel site have been modeled and are presented in the modeling report by Winsor [see Appendix D]). The application of the modeled sound pressure levels to establish wildlife hazard zones is presented below.

Hearing Sensitivities of Marine Mammals, Sea Turtles and Seabirds

A presumption is sometimes made that an animal cannot be harassed by a sound of a given frequency if it cannot hear in that frequency. However, animals can sometimes detect sounds or even be injured by sounds that are beyond their hearing thresholds; moreover, much of our knowledge of the hearing frequencies of marine mammals is based on the frequency range at which they vocalize. Animals, like humans, can hear sounds that are higher and lower than the frequencies at which they vocalize. Also, many recordings made of marine mammal vocalizations do not cover the full range of frequencies for the vocalizations. In summary, the collective knowledge of marine mammal hearing and detection capabilities is very limited.

The blue whale (*Balaenoptera musculus*) and the fin whale (*B. physalus*) are known to vocalize lower than the peak frequency of open water detonations (15 Hz). Other species of mysticetes may be able to detect or vocalize at such frequencies as well. Below a given decibel level, however, such sounds would not result in harassment or injury. Below ambient sound levels in the ocean, depending on the frequency range of such sounds, low frequency sounds from a detonation may not even be detectable. All birds, including seabirds, hear well in a frequency range of 100 Hz up to 8 to 10 kHz. Birds can probably detect and localize very low frequency sounds, especially if such sounds are intense (Bowles 1995). Much of the sound spectrum produced by a detonation would be audible to birds and could result in harassment if the birds were close to the detonation site (see Impacts Discussion MW-1, below).

3.4 Marine Wildlife

Table 3.4-7 presents frequency ranges for some species of marine mammals and sea turtles found in the SCB. Note that only two species, the blue whale and the fin whale, can detect sounds below 15 Hz.

Most of the frequency ranges listed above represent the range of frequencies in which these species vocalize. In a few cases, frequency response ranges are known and are presented. In all cases, the most extreme ranges known at low and high frequencies are noted.

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|--|---|--------------|
| PA1 | MW-1 | Removal of the 4H shell mounds would permanently remove contaminated sediments associated with the shell mounds from the marine environment. | Offshore Santa Barbara County (shell mound sites) | IV |

Impacts: Permanent Removal of Contaminated Sediments

As discussed in Section 3.2.4.1, removal of the shell mounds would eliminate risks of contaminant releases that could occur if the shell mounds were left in place and later disturbed by natural (e.g., storms, animal burrowing, subsidence) or human causes (e.g., trawling, anchoring). Specific impacts to marine wildlife could include acute toxicity and contaminant bioaccumulation in bottom-dwelling organisms exposed to dispersed mound materials. Eliminating these risks is a beneficial (Class IV) impact.

Table 3.4-7. Frequency Ranges for Selected Species

| <i>Taxa</i> | <i>Common Name</i> | <i>Genus/species</i> | <i>Frequency Range</i> |
|-------------|------------------------------|-----------------------------------|------------------------|
| Odontocetes | Short-beaked common dolphin | <i>Delphinus delphis</i> | 500 Hz to 67 kHz |
| | Short-finned pilot whale | <i>Globicephala macrorhynchus</i> | 500 Hz to 20 kHz |
| | Risso's dolphin | <i>Grampus griseus</i> | 80 Hz to 100 kHz |
| | Pacific white-sided dolphin | <i>Lagenorhynchus obliquidens</i> | 2 kHz to 80 kHz |
| | Northern right whale dolphin | <i>Lissodelphis borealis</i> | 1 kHz to 40 kHz |
| | Killer whale | <i>Orcinus orca</i> | 500 Hz to 120 kHz |
| | False killer whale | <i>Pseudorca crassidens</i> | 1.1 kHz to 130 kHz |
| | Spotted dolphin | <i>Stenella attenuata</i> | 3.1 kHz to 21.4 kHz |
| | Striped dolphin | <i>Stenella coeruleoalba</i> | 6 kHz to 24 kHz |
| | Spinner dolphin | <i>Stenella longirostris</i> | 1 kHz to 65 kHz |
| | Bottlenose dolphin | <i>Tursiops truncatus</i> | 40 Hz to 150 kHz |
| | Hubbs' beaked whale | <i>Mesoplodon carlhubbsi</i> | 300 Hz to 80 kHz |
| | Blainville's beaked whale | <i>Mesoplodon densirostris</i> | 1 kHz to 6 kHz |
| | Pygmy sperm whale | <i>Kogia breviceps</i> | 60 kHz to 200 kHz |

Table 3.4-7. Frequency Ranges for Selected Species (continued)

| <i>Taxa</i> | <i>Common Name</i> | <i>Genus/species</i> | <i>Frequency Range</i> |
|-------------|------------------------|-----------------------------------|------------------------|
| | Sperm Whale | <i>Physeter macrocephalus</i> | 100 Hz to 30 kHz |
| | Harbor porpoise | <i>Phocoena phocoena</i> | 1 kHz to 150 kHz |
| | Dall's porpoise | <i>Phocoenoides dalli</i> | 40 Hz to 149 kHz |
| Mysticetes | Gray whale | <i>Eschrichtius robustus</i> | 20 Hz to 2 kHz |
| | Minke whale | <i>Balaenoptera acutorostrata</i> | 60 Hz to 20 kHz |
| | Sei whale | <i>Balaenoptera borealis</i> | 1.5 kHz to 3.5 kHz |
| | Bryde's whale | <i>Balaenoptera edeni</i> | 70 Hz to 950 Hz |
| | Blue whale | <i>Balaenoptera musculus</i> | 12 Hz to 31 kHz |
| | Fin whale | <i>Balaenoptera physalus</i> | 14 Hz to 28 kHz |
| | Humpback whale | <i>Megaptera novaeangliae</i> | 20 Hz to 10 kHz |
| Pinnipeds | Northern fur seal | <i>Callorhinus ursinus</i> | 4 kHz to 28 kHz |
| | California sea lion | <i>Zalophus californianus</i> | 100 Hz to 60 kHz |
| | Northern elephant seal | <i>Mirounga angustirostris</i> | 200 Hz to 2.5 kHz |
| | Harbor seal | <i>Phoca vitulina richardsi</i> | 100 Hz to 180 kHz |
| Carnivores | Sea otter | <i>Enhydra lutris nereis</i> | 3 kHz to 5 kHz |
| Testudines | Cheloniid sea turtles | N/A | 60 Hz to 800 Hz |
| | Loggerhead sea turtle | <i>Caretta caretta</i> | 250 Hz to 1000 Hz |

Sources: Au et al. 2000; Lenhardt 1994; Moein et al. 1994; Richardson et al. 1995; Ridgway et al. 1997.

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|---|---|--------------|
| PA1 | MW-2 | Mortality, injury, permanent (hearing) threshold shift, temporary threshold shift, and/or harassment from explosives. | Offshore Santa Barbara County (Platform Hazel site) | II |

1 *Impacts*

2 Several impacts are possible with the use of explosives. These are summarized in the
3 above table and discussed in detail in the sections that follow.

4 PHYSICAL TRAUMA

5 Potential injuries from underwater explosives include damage to the lungs or intestines,
6 which can contain air or gas. Such damage could occur when an animal was subjected
7 to the rapid increase and decrease of pressure accompanying a detonation. Animals
8 exposed to such pressures would recover if the damage were slight, unless an infection
9 resulted in complications. Severe damage could be life-threatening. It should be

1 mentioned, however, that estimates of the levels at which lung damage might occur to
2 marine mammals are based on terrestrial animals (O'Keefe and Young 1984; Young
3 1991). Marine mammal lungs differ from the lungs of terrestrial mammals and have
4 evolved to withstand very high pressure.

5 Organ damage would occur if an animal were sufficiently close to high sound pressure
6 levels. Direct blast effects and mortality would occur if an animal were close to or at the
7 site of a large detonation. Fortunately, no marine mammal has suffered such injuries or
8 mortality in similar past projects in the region. In the unlikely event that serious injuries
9 or mortalities did occur, they would be considered takes under the MMPA, but such
10 impacts are mitigable (Class II).

11 Studies based on tests with terrestrial mammals suggest that larger animals are more
12 resilient to concussive forces (Yelverton *et al.* 1973; Yelverton 1981). Subsequent
13 researchers have estimated the effects of detonations on varying sizes of marine
14 mammals (O'Keefe and Young 1984; Young 1991). Estimates were also made of safe
15 ranges for human divers (Gaspin 1983; Young 1991). Humans generally take a deep
16 breath before submerging or breathe compressed air underwater, whereas cetaceans
17 often expel much of the air before descending.

18 Richardson *et al.* (1995) recommended that such estimates be used for small marine
19 mammals since empirical data were lacking. They also pointed out that, although
20 susceptibility to damage is believed to decrease with greater body size, such theories
21 are based on studies with terrestrial mammals and may not apply to marine mammals.

22 If more than one detonation occurred on a given day, seals and sea lions could be
23 attracted if any stunned or floating fish were present, thus placing them at risk. Such
24 animals learn quickly, so steps must be planned to avoid a conditioned "dinner bell"
25 response (see MM MW-4a3, which follows in this section). This occurred during the
26 Mobil Seaciff Pier Decommissioning Project, so detonations had to be delayed until the
27 animals left the hazard zone (Howorth 1998a).

28 Diving birds are subject to the same concussive forces that affect marine mammals
29 because they also have air and gas spaces in their bodies. As discussed in the
30 preceding paragraphs about marine mammals, smaller animals may be more
31 susceptible to sound pressure waves than are larger ones—and birds are much smaller
32 than marine mammals. Threshold levels projected in one study suggest that diving
33 seabirds are indeed more susceptible to the concussive effects of underwater
34 detonations than are marine mammals (Yelverton *et al.* 1973). Injuries or mortalities of
35 substantial numbers of seabirds (operationally defined as more than 10 individuals)
36 would be considered significant (Class II). Although birds are susceptible to the
37 airborne effects of detonations, including flying spray as well as concussive forces, no
38 airborne effects would occur during this project because the detonations would occur
39 beneath the sea floor in relatively deep water. If more than one detonation occurs the
40 same day, birds could be attracted to the area if any stunned or floating fish are present,
41 placing them at risk during the next detonation. Diving birds would be particularly
42 susceptible.

1 Studies have shown that sudden loud noises generally evoke more of a response in
2 waterfowl than in other birds. This may occur because they are hunted with firearms or
3 conversely, because they are unaccustomed to such noises (Bowles 1995). Startle
4 responses that do not result in injuries or mortalities would be considered less than
5 significant (Class III).

6 ACOUSTIC INJURIES OR MORTALITIES

7 Temporary or permanent hearing losses in marine mammals can be life-threatening.
8 Marine mammals rely heavily upon hearing to detect predators and prey, communicate,
9 and in the case of odontocete cetaceans, also to echolocate. Anthropogenic sounds
10 may also deter marine mammals from feeding grounds or migration paths. Thus, any
11 impact that compromises their ability to hear can be serious. Loss of hearing qualifies
12 as an injury, particularly if an eardrum is ruptured. When this occurs, infection
13 sometimes follows, especially in marine mammals and diving birds. This would be a
14 significant impact (Class II).

15 A temporary [hearing] threshold shift (TTS) can occur when an animal is subjected to
16 extremely loud noise, such as impulse sound generated by an underwater detonation.
17 TTS can also occur if an animal is subjected to loud sound for an extended period.
18 Following exposure to the sound, the animal may have diminished hearing capabilities
19 over part or all of its range of hearing. This temporary hearing loss can last for hours,
20 days or weeks, but does return to normal. The extent and duration of the hearing loss
21 determines the severity of the impact. For example, an animal that is temporarily
22 completely deafened for an extended period would be at far greater risk than an animal
23 which lost part of its hearing for a few hours. Such an impact would be considered at
24 least Level A Harassment under the MMPA and would be significant (Class II).

25 While TTS also occurs in birds, the impacts of such occurrences would generally pose
26 comparatively fewer risks. Unlike marine mammals, which rely heavily upon hearing,
27 birds rely primarily on sight for finding food, detecting predators and navigating. The
28 ability to hear vocalizations from other birds, as well as perhaps to detect predators,
29 could presumably be temporarily diminished. Many seabirds gather in numbers,
30 however, and if one bird suddenly takes flight, others often follow suit. TTS in birds
31 would be considered less than significant (Class III) unless an infection occurred as a
32 result of associated trauma (Class II).

33 A permanent [hearing] threshold shift (PTS) can occur when an animal is subjected to
34 an extremely loud sound. Following exposure to the sound, the animal will have
35 diminished hearing capabilities over part or all of its range of hearing. The hearing loss
36 is permanent. PTS can occur when an animal is subjected to impulse sounds such as
37 those generated by underwater detonations. It also occurs over part of the hearing
38 range in the normal process of aging. Such an impact would be called a take under the
39 MMPA and would be considered significant (Class II).

40 PTS in birds, while serious, is not necessarily life-threatening, especially to those which
41 rely on numbers for safety. This is not to say that PTS is inconsequential, but rather to

point out that it is generally not as serious in birds as it is in marine mammals. Unlike mammals, birds are able to regenerate hair cells in the inner ear after substantial losses (Corwin and Cotanche 1988; Ryals and Rubel 1988). This can take about 2 months, depending on the amount of damage. Thus, measurements of TTS or PTS in birds may not be a reliable indicator of permanent hearing loss (Bowles 1995). PTS in birds could be significant (Class II) if they developed infections as a result of associated trauma.

ACOUSTIC HARASSMENT

The four series of detonations required in PA1, PA2, and PA5a to demolish the concrete in the caissons, whether conducted as four or more separate operations or as one closely timed operation, have some potential of harassing marine mammals. The harassment would consist of a startle response to the sudden sound of the detonations. Behavioral changes could include a change in the depth or duration of a dive, evasive maneuvers, less conspicuous blows in larger cetaceans, trumpeting—loud vocalizations on or below the surface—or a sudden change in course or speed. It could also include pinnipeds hauled out on buoys diving into the water. Such responses would be temporary. This type of reaction would be classified as Level B Harassment under the MMPA (Class III).

Birds in the area during the time of detonations may be disturbed by the detonations, resulting in a less-than-significant impact (Class III). Birds on the water or perched on vessels or buoys could dive or take flight, although the concussive effect of an underwater detonation would pass before the airborne sound could be detected because the speed of sound is far greater in water than in air (about 1500 meters a second compared to 300 meters a second). However, birds that had dived as an evasive move could be at risk from subsequent detonations.

CHEMICAL EFFECTS OF DETONATIONS

The chemical effects from the detonations are not expected to be hazardous to marine life. The few remaining solid residues in the water would be rapidly dispersed and diffused by currents. Most of the products of the detonations would be released in the form of various gases, which would harmlessly dissipate in air. With underwater detonations, some fraction of these gases would remain in the stabilized surface pool area after the detonation. The larger and deeper the detonation, the larger the pool, particularly with open-ocean, deep water detonations. With shallow water detonations such as those proposed for the Hazel caissons, however, such gases would rapidly escape to the air. The composition of these gases depends upon the explosive material that is ultimately used. Charges made from ammonium nitrate and fuel oil (ANFO) leave ammonia in the water and cannot be used because they are highly toxic to marine life. In similar past projects in the region, explosives included composition B, RDX, nitro methane, Magnum Dynamite, and Power Ditch 1000 (Howorth 1996; 1997a and b; 1998a).

Detonations are also expected to result in the temporary suspension of seafloor and shell mound sediments. Given the small size of the charges and limited range of effects, these sediments are expected to cover only a small area and would quickly

dissipate and settle. Chemical and turbidity impacts of detonations would be considered less than significant (Class III). The wells beneath Platform Hazel were shut in prior to September 1992 in accordance with accepted practices (Chevron U.S.A. Production Company 1994) and should not be affected by the removal of the caissons.

MITIGATION MEASURES FOR IMPACT MW-2

MITIGATION MEASURES CONSIDERED FOR USE WITH EXPLOSIVES BUT REJECTED

Several potential mitigation measures that have been applied in other projects were considered but rejected, for the following reasons:

- *Passive acoustic monitoring:* Although passive acoustic monitoring for marine mammal vocalizations can reveal whether marine mammals are in the vicinity, establishing the location of such animals is difficult. Animals could be present in the area but well outside the hazard zone. Moreover, this method is dependent upon animals vocalizing. On many occasions, they are silent, thus not hearing any marine mammals is no guarantee that they are not in the area. During the 4H Project, six species of marine mammals, totaling 1,681 animals, were reported during the line transect and hazard zone surveys, yet no vocalizations were heard (Howorth 1996).
- *Killer whale playback calls:* Playing back underwater recordings of killer whale (*Orcinus orca*) vocalizations was employed during the 4H Project as a means of deterring other marine mammal species from the detonation sites. This measure had been included among the permit conditions. Far from deterring other species, it appeared to attract California sea lions and Pacific harbor seals to the detonation sites. At best, it had no effect. With the approval of NOAA Fisheries, this measure was not continued (Howorth 1996).

Killer whale playback calls have elicited some avoidance reactions in California gray whales according to some researchers (Cummings and Thompson 1981; Malme et al. 1983; Dahlheim 1987). The effectiveness of this tactic with other species seems doubtful at best. Several fundamental problems exist. First, killer whale recordings made in the area where they are intended to be used are not always available. Marine mammals in a given area may only respond to killer whale sounds recorded in that area. Next, killer whale vocalizations should be recorded on equipment that captures the full frequency range of killer whale vocalizations. Standard recording equipment does not have this capability. Next, most recordings have considerable background noise which is broadcast along with the killer whale sounds, often introducing incongruous elements. The recording equipment itself can introduce other sounds. The fidelity of the playback is often far from perfect, resulting in an unnatural reproduction of the original sound. The end result of playing back such a flawed recording is that it may well not serve the purpose for which it is intended, even assuming that the species present have learned to flee from the sound of killer whales.

- *Bubble curtains:* Bubble curtains have been employed in a number of projects with varying success. The primary purpose of a bubble curtain is to absorb and scatter the sounds of detonations or pile driving. A secondary purpose is to scatter fish around a detonation site.

A bubble curtain was employed during the Mobil Seacliff Pier Decommissioning Project. Although the sound of the bubble curtain was discernible through the ambient sounds at close ranges because the frequencies were different, it did not appear to add to the intensity of ambient sounds. No difference in sound pressure levels was noted with the bubble curtain on or off during detonations (Howorth 1998a).

For a bubble curtain to be effective, it must produce bubbles of a given size and number in a given thickness. This requires a sophisticated, multi-tiered device. Simply placing a perforated air hose on the sea floor is not effective. New devices, consisting essentially of insulated pads that can be wrapped around a structure, show considerable promise in reducing sound pressure levels from detonations. Such a device could be employed if external charges are used to demolish the caissons, although sound pressure levels would generally be low because of the small charge weights and staggered detonations. Blast mats, made of heavy rubber, are often used to reduce flying fragments during airborne detonations and to confine the rubble to a small area. These are quite effective, although they do not appreciably lower sound pressure levels.

The use of bubble curtains to frighten fish away from a detonation site has been proposed for the caisson demolition at the Arco PRC-421 site off Ellwood, California (Padre Associates, Inc. 2002). Bubble curtains used during the Mobil Seacliff Pier Decommissioning Project may have helped reduce fish mortalities (Howorth 1998a).

Fish are abundant at the Arco PRC-421 site compared to the Hazel shell mound site (Padre Associates, Inc. 2002; de Wit 1999). Fish were also relatively abundant at the Mobil Seacliff Pier site (Howorth 1998a). Considering the low numbers of fish at the Hazel site, the use of a bubble curtain is not expected to result in any measurable differences in fish mortalities.

Finally, bubble curtains may frighten away transient fish (no fish reside in the shell mounds). Conversely, it is possible that the rising bubbles may displace benthic nutrients, causing them to upwell and actually attracting mid-water and pelagic fish.

- *Shaped or targeted charges:* Shaped charges are generally used when holes cannot be drilled into a structure for the placement of internal charges. Such charges are shaped so that much of the energy is directed into a structure. A considerable amount of energy also escapes into the water column, however,

1 resulting in unacceptably high sound pressure levels. Other shaped charges are
2 designed to be used inside steel structures such as pilings and well conductors.

3 Targeted charges were used to sever the hollow platform legs of Platforms
4 Heidi, Hope and Hilda. These charges consist of boosters above and below
5 the main charge. The boosters detonate simultaneously, causing the main
6 charge to explode laterally, severing the steel leg. Fast-burning explosives
7 are used for this purpose so that the steel is cut. Targeted charges would not
8 be applicable to demolishing concrete.

9 Slower-burning explosives are used to demolish concrete. They are placed
10 into holes drilled into the concrete. The more energy that can be contained
11 within the concrete, the more effective the detonation is in shattering the
12 concrete. More importantly from a mitigation standpoint, the more energy that
13 is released into the concrete, the less that escapes into the water column.
14 Another mitigation benefit is that less explosives are needed for internal
15 charges because of the effectiveness of internally placed charges in
16 demolishing concrete.

- 17 • *Timing to avoid gray whale migrations:* In a number of past projects, explosive
18 demolitions were timed to avoid the California gray whale migration period,
19 generally considered to extend from 1 December through 30 May in California
20 waters. Early and late during this period, however, the vast majority of gray
21 whales are off northern California or even farther north.

22 The original intent of this seasonal measure was to protect an endangered
23 species. The gray whale was delisted in 1993, however, after the stock
24 recovered (Rugh et al. 1999). Research since that time indicates that
25 substantial numbers of gray whales do not appear in the Santa Barbara
26 Channel until late December and early January, with only a few individuals
27 migrating south as early as October, November or early December. The
28 research further reveals that most gray whales have passed the channel by
29 the end of April, with only a few stragglers continuing west and north in May.
30 The research also indicates that the majority of gray whales in the SCB
31 migrate past the Channel Islands during both the south and northbound
32 migrations (Carretta et al, 2000; Howorth 1998b). Pulses of migrating
33 animals occur along the coast, with few or any seen on some days and
34 several on others. With adequate monitoring, as described in MM MW-1j,
35 below, potential risks to gray whales can be minimized.

36 As the gray whale population recovered, substantial numbers (50-200) of
37 humpback whales began appearing in the Santa Barbara Channel in late
38 May, generally staying until late summer or fall. This has occurred every
39 year since 1987. Two years later, similar numbers of blue whales began
40 appearing in the Santa Barbara Channel, usually in early June. The blue
41 whales also usually remained through the summer into the fall. Both species
42 were attracted to large quantities of krill, favored prey species. Both species

are endangered. If demolition activities are conducted during the gray whale migration period, the odds of any impacts to endangered blue and humpback whales, plentiful farther out in the Santa Barbara Channel in summer and fall, would be virtually eliminated. (Even when such species are present, their occurrence near the project site is rare, and MM MW-1j, below, should minimize any chances of impacts to these species.) As mentioned earlier, risks to gray whales can be minimized as well with adequate safeguards.

MITIGATION MEASURES FOR IMPACT MW-2

MW-2a

In the event that explosives are used to demolish the Hazel caissons, the CSLC will require the preparation and implementation of a detailed Marine Wildlife Protection Plan (Plan), incorporating all relevant permit conditions from the regulatory agencies and the harassment authorization, if necessary (see below), as well as all of the elements discussed in this section. The plan shall be prepared and submitted to the regulatory agencies for approval. The plan shall identify key points of contact, vessels and equipment to be used in the project, contractors, schedules, and procedures. The plan shall also identify the latest acoustic deterrence options for marine mammals and make recommendations as to whether such deterrence devices should be implemented. If a recommendation is made to provide acoustic deterrence, then this shall be included in the harassment authorization. The plan shall incorporate the following elements:

MW-2a1

Independent, third-party mitigation monitors shall be approved in advance by NOAA Fisheries in consultation with the California Department of Fish and Game. The monitors shall have regional experience in mitigation monitoring from small boats and aircraft, and sufficient biological knowledge to identify most species of marine mammals, sea turtles and seabirds that might be encountered in or near the project site.

MW-2a2

Appropriate regulatory agencies shall be notified in advance as to when the project will commence. Notice shall be provided according to the requirements of each regulatory agency.

Agency-approved wildlife rescue centers shall be notified in advance of the project so that, in the unlikely event wildlife is injured, the animal(s) can be rescued and rehabilitated. (This is a precautionary measure.)

Key personnel shall participate in a pre-project briefing. Topics will include a description of all activities, including schedule, equipment, vessels, and other aspects, establishment of key points of contact and responsible parties, safety issues, and mitigation efforts, including the ability of the chief monitor to postpone activities if it appears that a potential for injuring marine mammals, sea turtles or seabirds exists.

- 1 **MW-2a3** *Multiple and reliable means of communications shall be provided for*
2 *communications between the monitors, various vessels and aircraft, and the*
3 *demolition supervisor. Responsible parties and key points of contact shall be*
4 *identified in advance.*
- 5 **MW-2a4** *Sufficient notice shall be provided to the monitoring team so that the team has*
6 *time to mobilize, travel to the site, either by aircraft or boat, and perform line*
7 *transect surveys at least 1 hour in advance of each detonation. The method of*
8 *conducting line transect surveys shall be in accordance with generally*
9 *accepted practices. Aerial and shipboard line transects shall be performed*
10 *before each detonation to determine the abundance, diversity and distribution*
11 *of wildlife in the area.*
- 12 *Aircraft and vessels dedicated to monitoring shall be approved in advance by*
13 *the regulatory agencies. Vessels shall have low-emission engines. Aircraft*
14 *and vessels used for monitoring shall be independent from project vessels and*
15 *aircraft.*
- 16 *If any dead, floating wildlife is found during the surveys, it shall be tagged if*
17 *possible and recorded. If any chance exists that such wildlife represents a*
18 *casualty of site activities, it shall be collected if possible and examined by*
19 *qualified personnel to establish the cause of death.*
- 20 *Once the line transect surveys have been completed, the vessels and aircraft*
21 *shall survey the hazard zone and immediate area. If any protected wildlife is*
22 *found in the hazard zone or immediate vicinity, the detonation shall be*
23 *postponed by the chief monitor until such wildlife is no longer in the hazard*
24 *zone or immediate area. Provided a harassment authorization is obtained,*
25 *any wildlife that lingers in the hazard zone will be encouraged to leave by*
26 *using non-injurious methods (see MM MW-2a5, below). Once these areas are*
27 *clear, the demolition supervisor will be advised by the chief monitor so that*
28 *final preparations can be made to fire the charges. Since no danger exists*
29 *from underwater detonations to seabirds perched on the vessels or buoys, no*
30 *effort shall be made to clear them from the area.*
- 31 **MW-2a5** *The Applicant shall request a harassment authorization from NOAA Fisheries.*
32 *This authorization would allow the harassment of small numbers of California*
33 *sea lions and Pacific harbor seals lingering in the hazard zone. Such*
34 *harassment could consist of having an agency-approved mitigation monitor*
35 *approach the animals to coax them out of the hazard zone for their own safety.*
36 *It could also include non-injurious acoustic deterrence devices. Neither*
37 *method would result in any harm to the animals. If any animals were still in*
38 *the hazard zone an hour before sunset, the detonation shall be postponed*
39 *until the next day. This is to allow time to perform the post-detonation*
40 *activities described below.*

- 1 **MW-2a6** *The monitors shall establish and maintain a 1,000-meter wildlife hazard zone.*
2 *Detonations will be postponed if any marine wildlife is seen inside or about to*
3 *enter this zone. This zone shall be adjusted if sound pressure measurements*
4 *(see MM MW-2a9, below) indicate that the zone does not ensure an adequate*
5 *margin of safety. The shipboard line transect area shall be used as a buffer*
6 *zone.*
- 7 **MW-2a7** *Immediately prior to the detonation, the mitigation monitoring vessels and*
8 *other project vessels designated by the demolition supervisor shall retire to the*
9 *vessel exclusion zone. Vessels not engaged may be required to maintain a*
10 *greater clearance.*
- 11 *Depending upon the means employed to detonate the charges, radio silence*
12 *may be imposed by the demolition supervisor. If this occurs, visual signals*
13 *shall be employed in the event protected wildlife strays into the hazard zone*
14 *before the detonation occurs. The type of visual signals to be used shall be*
15 *worked out in advance between the demolition supervisor and the chief*
16 *monitor. Such a signal can be displayed by either the monitors or the*
17 *demolition crew in the event wildlife is observed in the hazard zone.*
- 18 *Provided the charges are ready and the hazard zone has been declared clear*
19 *by the chief monitor, the demolition supervisor may fire the charges. The*
20 *charges shall be fired no later than prior to one hour before sundown to allow*
21 *adequate post-detonation monitoring and fish recovery. If possible, all four*
22 *concrete sections of the caissons shall be demolished in four closely spaced*
23 *series of detonations, or at least in as many as feasible, depending on the*
24 *discretion of the demolition supervisor. The fewer detonation events, the less*
25 *are the risks to wildlife since each event poses essentially the same risks.*
26 *When multiple charges are fired, the sequence shall be staggered to prevent a*
27 *buildup of sound pressure levels.*
- 28 **MW-2a8** *The least amount of explosives necessary to safely shatter the concrete shall*
29 *be used. Sandbags or similar inert materials shall be placed on top of the*
30 *concrete to help contain the energy and reduce sound pressure levels. The*
31 *steel outer caisson jacket shall be left in place to help contain the energy and*
32 *reduce disturbance to the sea floor. A berm made of bags of gravel and sand*
33 *shall be placed around the outside of each caisson to further contain the*
34 *energy and reduce sound pressure levels. The detonations shall take place in*
35 *series as close together as deemed safe and practical by the demolitions*
36 *contractor.*
- 37 **MW-2a9** *Measurements shall be made of sound pressure levels produced by each*
38 *series of detonations. The measurements shall be made at various distances,*
39 *depths and directions from each detonation site identified in the Plan. The*
40 *results of these measurements shall be made available to the chief monitor as*
41 *soon as possible after the detonation. This can be done within a few minutes.*
42 *In no event can the next series of detonations take place until the results of the*

measurements have been provided. If unexpectedly high sound pressure levels are measured, the hazard zone shall be expanded in accordance with levels accepted by the regulatory agencies as being safe for marine life. An additional safety margin will be provided to allow for variables in the detonations. The regulatory agencies shall be immediately apprised of the expanded hazard zone.

Data shall be regularly recorded, including detailed wildlife observations, onsite weather and project activities. The date, time, exact geographic position, and person recording the data shall be identified on all of the forms. Data recording shall be conducted in such a way that the effectiveness of the mitigation effort can be analyzed upon completion of the project.

MW-2a11 All personnel shall remain in place after the detonation until the demolition supervisor has given an all-clear signal. This is to confirm that all charges have fired. Once the all-clear has been given, the aircraft and boats shall resume their survey of the hazard zone and immediate area to ensure that no wildlife escaped detection. The area shall be surveyed for at least half an hour.

MW-2a12 In the unlikely event that any marine mammal, sea turtle, or a substantial number of seabirds becomes injured as a consequence of activities, the following persons and organizations shall be immediately notified by telephone:

- Marine mammals and sea turtles: the Stranding Network Coordinator at NOAA Fisheries in Long Beach (562) 980-4017 and the Santa Barbara Marine Mammal Center (805) 687-3255; and
- Seabirds: Santa Barbara Wildlife Care Network (805) 966-9005.

Both rescue organizations have personnel trained in the rescue and rehabilitation of injured wildlife. Rescue efforts shall be initiated immediately, onsite weather conditions and personnel safety permitting.

A written report of the incident, including any rescue efforts, shall be sent electronically to the permitting agencies within 24 hours of such an incident. The permitting agencies can suspend further explosives work if circumstances warrant.

MW-2a13 A complete mitigation monitoring report shall be delivered to the regulatory agencies within deadlines established in either permits or the Plan. The report shall contain all of the information required, including a description of the removal methods used, monitoring methods, results, including wildlife sighted and the effectiveness of the mitigation measures, and recommendations for similar future projects.

3.4 Marine Wildlife

MM MB-6a would also apply to this impact. By promptly removing fish killed following detonations, the “dinner bell” effect for marine mammals and seabirds would be avoided.

RESIDUAL IMPACTS

With implementation of the mitigation measures discussed above, and after the demolished materials were removed and the site smoothed to its natural contours, residual impacts from the use of explosives are anticipated to be less than significant (III).

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|---|--|--------------|
| PA1 | MW-3 | The use of a mechanical cutting device would result in the prolonged presence of equipment and attendant risks. | Santa Barbara County (shell mound sites) | II |

Impacts

MECHANICAL CUTTING

The use of mechanical methods to remove the caissons has a number of drawbacks that are discussed in Section 2.1.2.2. Also, mechanical cutting activities would pose risks to marine wildlife as described below.

- Prolonged Presence:* In the Mitigated Negative Declaration adopted for the 4H Project, it was estimated that using mechanical cutting devices to sever pilings would take three to four weeks per platform to accomplish, compared to three to four days per platform with explosives (Chevron U.S.A. Production Company 1994). The document also pointed out that mechanical cutting operations required a stable base of operations (i.e., the oil production platform deck). This would not be possible for the caisson demolition operations because the decks have already been removed (Howorth 1996). Even if a sufficiently stable platform could be provided, vessels and equipment would have to remain in place much longer than if explosives were used, resulting in prolonged impacts in air quality, noise and vessel traffic and increased chances of other impacts on marine life, such as collision and oil releases. The prolonged presence of vessels at the project site would be considered Class III under significance, and Class II if any injuries or mortalities of marine wildlife occurred.

MITIGATION MEASURES FOR IMPACT MW-3

MMs MW-2a1-a13, MW-4a1-a3, and MW-6a would apply to this impact.

RESIDUAL IMPACTS

No residual impacts are anticipated once any mechanical cutting operations had been completed, the demolished materials were removed, and the site smoothed to its natural contours.

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|--|---|--------------|
| PA1 | MW-4 | Decommissioning activities, including increased vessel traffic, use of temporary mooring buoys, discharge of wastes, unauthorized fishing activities, and anchoring, can result in mortality, injury or harassment of marine wildlife. | Offshore Santa Barbara County (shell mound sites) | II |

Impacts

COLLISION RISKS WITH INCREASED VESSEL TRAFFIC

Increased vessel traffic does increase the risk of collision, even though such risk is slight. Most collisions between vessels and marine mammals involve whales and large ships, however, not the smaller craft used for decommissioning projects. Many modern commercial ships have a bulbous protuberance underwater at the bow. This dramatically reduces the bow wake, producing greater speed and efficiency, and also much less noise from the bow wake. Since the machinery and propeller are located well aft, the principle noise source of the ship may not be loud enough to warn marine mammals of a ship's approach, particularly since some ships can be up to 400 meters long. Moreover, modern merchant ships can be quite fast, traveling at 20 knots or greater. In small craft, the noise source and most dangerous part of the vessel — the shaft, strut, propeller and rudder — are in virtually the same place. This may explain why nearly all ship strikes to whales involve large vessels rather than small craft. Conversely, ship strikes involving pinnipeds, small cetaceans and sea otters, though uncommon, usually involve small, very fast boats (pers. comm., Cordaro, NMFS, 2002). In a number of cases, however, wounds on sea otters attributed to vessel strikes later proved to have been caused by great white sharks (*Carcharodon carcharias*). This was determined by recognition of tooth and bite patterns, and in some cases, tooth fragments (Ames and Morejohn 1980).

Collisions between vessels and marine mammals and sea turtles have been documented for the following listed species (NMFS and USFWS 1998a-d; Stinson 1984; Carretta et al. 2001):

- Blue whale,
- Fin whale,
- Humpback whale,
- Southern sea otter,
- Loggerhead sea turtle,
- Green sea turtle,
- Olive ridley sea turtle, and
- Leatherback sea turtle.

It is possible that collisions have occurred between vessels and sei whales or northern right whales in the eastern Pacific but have not been reported (Carretta et al. 2001; Angliss et al. 2001). Only a few pinnipeds struck by vessels have been reported over the past 26 years by the Santa Barbara Marine Mammal Center (unpublished records, 1976-2002). No sea turtle ship strikes have been reported in the area. No collisions have been reported between any oil supply or crew vessels and any marine mammals or sea turtles (pers. comm., Cordaro, NMFS, 2002). The likelihood of a collision between a vessel and a marine mammal or sea turtle is remote, especially if a watch is maintained while vessels are underway and prudent operational procedures are followed when marine mammals are in the area. In the unlikely event that such an impact occurred, it would be considered either Level A Harassment or a take under the MMPA, depending on whether the animal was injured. This type of impact would be considered potentially significant (Class II).

TEMPORARY MOORINGS

Animals hauled out on temporary mooring buoys at or near the project site could be at risk. California sea lions (*Zalophus californianus c.*) regularly haul out on mooring buoys adjacent to oil platforms. No other species uses mooring buoys for hauling out. Large, cylindrical “can” buoys are frequently used by sea lions near oil platforms. Small spherical buoys, 1 to 2 meters in diameter, are seldom used by sea lions, and even when they are used, far fewer animals, if any, can haul out on them. When approached or startled, the sea lions enter the water, which could expose them to hazards from explosives use or vessel traffic. This impact is potentially significant (Class II).

WASTES AND FISHING ACTIVITIES

Wastes from meals dropped over the side can attract seabirds and marine mammals that have become accustomed to scavenging meals from vessels. Fishing activities during breaks can also attract seabirds and marine mammals and can result in the incidental entanglement of seabirds and marine mammals. Most importantly, attracting animals to an area increases other risks from project activities, particularly when explosives are used. This impact is potentially significant (Class II).

ANCHORING

Anchoring itself poses no threats to marine mammals, sea turtles or seabirds because such animals have excellent senses and are quite swift and agile. Should an anchor become fouled in a subsea oil pipeline, however, resulting in damage to the pipeline and an oil spill, such creatures would be vulnerable to impacts from the spill. Such impacts would be considered potentially significant (Class II).

MITIGATION MEASURES FOR IMPACT MW-4

MW-4a | *The following operational procedures shall be adopted to minimize the chances of impacts from collision and attracting marine wildlife to potentially hazardous areas:*

MW-4a1

To reduce the chances of collision, all vessel operators and crews shall receive briefings to explain the importance of avoiding marine mammals and sea turtles. A watch shall be maintained for marine mammals and sea turtles at all times while underway. If any whales are observed, the operator shall employ the following procedures:

- *Do not approach whales closer than 1,000 feet.*
- *Approach whales from the side or rear on a parallel course.*
- *Do not cross directly in front of the whales.*
- *Maintain the same speed as the whales.*
- *Do not attempt to herd or drive any whales.*
- *If a whale exhibits evasive behavior, stop the vessel until the whale has left the immediate area.*
- *Do not come between or separate a mother and its calf.*
- *If any dolphins or porpoises ride the wake of any vessel, the vessel shall slow or stop until the animals disperse. This is to avoid leading the animals into a potentially hazardous area.*
- *In the unlikely event that a marine mammal is injured, the operator shall immediately notify the marine mammal monitors, the Stranding Network Coordinator at NOAA Fisheries in Long Beach (562-980-4017) and the Santa Barbara Marine Mammal Center (805-687-3255) so that a rescue effort may be initiated (see MM MW-2a13).*

MW-4a2

Temporary moorings shall be spherical rather than cylindrical and shall be as small as practicable to avoid creating haulout structures attractive to California sea lions. If any sea lions are hauled out on project buoys, the marine mammal monitors shall be notified.

MW-4a3

To avoid attracting marine mammals and seabirds to a potentially hazardous location, all wastes shall be properly disposed of in lidded containers. No wildlife shall be fed. Fishing activities, which could attract wildlife or result in incidental entanglement, shall not be allowed.

MB-2a would apply to impacts from oil or fuel spills.

RESIDUAL IMPACTS:

No residual impacts are anticipated.

3.4 Marine Wildlife

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|---|--|--------------|
| PA1 | MW-5 | Dredging activities can result in release of toxic substances or bioaccumulation of contaminants. | Offshore Santa Barbara County (shell mound sites) | II |

Impacts

CHEMICAL CONTAMINANTS

Section 3.2 indicates that a number of contaminants would be present at moderately elevated concentrations in the immediate vicinity of the dredging operation, but that contaminants would be dispersed into the water column, and concentrations diminished to background levels, within a few meters. The environmental clamshell bucket and other mitigation measures would minimize the uncontrolled release of contaminants in the area. As a result, the potential exposure of marine wildlife to such contaminants would be very limited. With mitigation, impacts from these contaminants would be considered less than significant (Class II).

Toxic contaminants are substances that may cause damage to body structure or impairment of function when ingested, inhaled, absorbed, or developed within the body in relatively small amounts.

A significant number of contaminants are not readily degradable, have entered food webs and have a demonstrated or suspected detrimental impact on marine organisms (Reijnders et al. 1999). Scientists worldwide have amassed a wealth of information on chemical and metallic residues found in marine mammals. Much of this information comes from dead stranded specimens. Very little data are available on the effects of such residues, however. Logistical, political and financial constraints have resulted in almost no controlled experiments on the effects of chemicals or metals on marine mammals (Reddy et al. 2001). While many scientists believe that some anthropogenic substances may indeed be harmful to marine mammals, they consistently caution against making any assumptions until conclusive evidence is available (Reijnders et al. 1999; Reddy et al. 2001). Similar problems and reservations exist about the potential effects of chemicals and metals on seabirds.

The presence of potentially toxic substances in marine mammals does not necessarily indicate that such animals have been harmed, even if the levels are relatively high. Some of these chemicals and metals can probably be found in every vertebrate animal on the planet, especially if sophisticated diagnostic techniques are used (Reddy et al. 2001). Nonetheless, sufficient evidence is available from research on terrestrial mammals, humans and a few marine mammal species to cause concern over the potential effects of chemicals and metals. Even some substances that are now banned continue to find their way into the marine environment, adding to the burden of such materials already present in the world's oceans.

1 Some evidence is available on the effects of certain chemicals on marine wildlife. For
2 example, it is widely known that seabirds and sea otters can die after becoming coated
3 with oil. Conversely, however, no definitive evidence exists of contamination of tissues
4 or toxicological effects of oil on cetaceans (O'Hara and O'Shea 2001).

5 Marine mammal, sea turtle and seabird species occurring in the region are far-ranging
6 (see Sections 3.4.4.1 through 3.4.4.3). Few of these species feed on organisms directly
7 associated with the shell mounds. Two species of pinnipeds, the California sea lion
8 (*Zalophus californianus* c.) and the Pacific harbor seal (*Phoca vitulina richardsi*),
9 occasionally feed of rockfish (*Sebastes* spp.). Cetaceans do not feed on organisms
10 resident at the shell mounds. The shell mounds lie almost at the limit of depth for sea
11 otters (*Enhydra lutris nereis*), which are very uncommon in the immediate area.
12 Moreover, far more favorable foraging grounds for sea otters exist in the shallower
13 waters near shore. Sea turtles, which are rare in the region, feed on algae and jellies
14 not resident at the shell mounds. Some diving birds (e.g., cormorants and scoters)
15 were frequently seen foraging around the platforms, but now that virtually all of the
16 structures have been removed, very little prey remains.

17 Even if some individual marine mammals or seabirds preyed on shell mound organisms
18 such as rockfish, toxic substances have not been reported in such prey at the shell
19 mounds. Moreover, such prey are scarce now, according to various studies, and would
20 not support even a few individual pinnipeds. In conclusion, the odds of potentially toxic
21 substances from the shell mounds bioaccumulating in marine mammals or seabirds are
22 extremely remote, given the range of such animals, the limited prey at the shell mounds
23 and the lack of toxic substances in such prey.

24 The amount of residual hydrocarbons in the shell mounds is low and can be easily
25 controlled with containment equipment that will be on hand during this project. No
26 major oil or fuel spill is possible, given that the wells have been plugged and abandoned
27 and that the vessels used for this Program Alternative will be small.

28 Nonetheless, given the growing body of evidence that indicates a definite potential for
29 harm from toxic and/or bioaccumulative contaminants, a conservative approach has
30 been taken toward assessing impacts from such contaminants. The unconfined release
31 of toxic contaminants is considered a significant impact (Class II).

32 *Hydrocarbon Residues:* Hydrocarbon residues exist in the shell mounds. As the shell
33 mounds are dredged, some of this material may be released into the water column and
34 float to the surface. The amount of hydrocarbons is expected to be small. A slight
35 chance also exists of a small oil or fuel release from project machinery. The wells
36 beneath the platform sites were shut-in prior to September 1992 in accordance with
37 accepted practices (Chevron U.S.A. Production Company 1994) and should not be
38 affected by the removal of the shell mounds. Also, no problems with the wells occurred
39 during the 4H Project, in which the legs of three of the four platforms were severed
40 using explosives (Howorth 1996). The chances of a spill of any magnitude are remote,
41 particularly with the mitigation measures that will be required.

1 Marine mammals are susceptible in varying degrees to hydrocarbons. Sea otters,
2 which rely solely on air trapped in their fur for insulation, are particularly vulnerable.
3 Without air in the fur, buoyancy is lost, resulting in greater expenditure of energy. When
4 a fur-bearing animal becomes coated with oil, it often attempts to rid itself of the oil by
5 grooming. This often results in the oil penetrating more deeply into the fur. It can also
6 result in ingestion of oil. Oil can also be ingested in prey. Fur seals rely upon air
7 trapped in their fur as well as blubber for insulation. Consequently, they are vulnerable
8 to oil, but somewhat less so. Adult and juvenile pinnipeds primarily rely on their blubber
9 layer for insulation and are generally not as susceptible when they are coated with oil.
10 Pinniped pups, which are born without a blubber layer and rely on their pelt for
11 insulation, are susceptible, however. Although phocid seal (i.e. harbor and elephant
12 seals) pups can swim within minutes of birth, they usually remain on or very close to
13 their rookery beaches for the first 2 to 3 weeks, at which point they have developed a
14 blubber layer and are less susceptible to the effects of oil on their pelts. Otariid pups
15 (i.e. sea lions and fur seals) remain on the beaches for a longer period and do not begin
16 venturing out to sea until they are 8 to 12 weeks old, although they do explore tidepools
17 within a week or two of birth. Thus, for an oil spill to severely impact pinniped pups, it
18 would have to spread to the beaches and areas immediately offshore from the rookeries
19 before the pups had developed blubber layers. The nearest rookery is at Carpinteria, 5
20 nm east of the project site. The likelihood of a significant spill occurring, much less
21 reaching even this rookery, is remote. Other rookeries exist at considerably greater
22 distances from the project site (see Section 3.4.1.1).

23 Cetaceans do not appear to be particularly susceptible to oil on their skin or, in the case
24 of mysticetes, in their baleen either (O'Hara and O'Shea 2001). Following the 1969 oil
25 spill at Union Oil Company's (now Unocal) Platform A, no evidence was found of
26 cetacean mortality, even though the spill occurred during the northbound gray whale
27 migration (Brownell 1971). California sea lions and northern elephant seals contacted
28 by the spill did not suffer any mortalities, either (Brownell and Le Boeuf 1971; Le Boeuf
29 1971).

30 The vulnerability of seabirds, particularly diving birds, to becoming oiled, has been well
31 documented worldwide. Acute effects involve clogging the fine structure of the feathers,
32 which repel water and trap air for insulation against the cold (Holmes and Chronshaw
33 1977). Once the feathers no longer serve as insulation, the metabolic rate increases,
34 resulting in the exhaustion of fat reserves and muscular energy and culminating in
35 mortality (Hartung 1967; Croxall 1977). The fouled feathers also result in a reduction of
36 buoyancy, causing even greater energy loss (Briggs et al. 1997).

37 When seabirds become oiled, they usually preen, resulting in ingestion of oil. Aliphatic
38 compounds in the oil can become concentrated in the liver, resulting in detrimental
39 behavioral abnormalities (Kuletz 1997). A large array of inflammatory and toxic effects
40 on internal organs can also occur (Leighton 1991). Among other problems, oil in the
41 gastrointestinal tract can lead to poor absorption of nutrients (Briggs et al. 1997). Oil
42 ingestion can also result in concentrations of polycyclic aromatic hydrocarbons (see
43 discussion below).

Should a marine mammal become oiled, which is very unlikely, this generally would be considered significant but mitigable (Class II). In the case of sea otters, pinniped pups, or severely oiled adults, such an impact would be particularly significant because it could threaten the health or life of the animal (Class II). Oiled seabirds would also be significant because of their proven vulnerability (Class II).

Polyaromatic hydrocarbons: Polyaromatic hydrocarbons, also called polynuclear or polycyclic aromatic hydrocarbons, were found in all of the shell mound sites in low to significant concentrations (see Section 3.2.1). PAHs are one of many groups of compounds found in oil. Unlike PCBs, PAHs tend to remain concentrated relatively close to their source (Simmonds et al. 2001).

All marine mammals can be susceptible to the volatile elements of hydrocarbons, which can be taken in while respiring in a contaminated area. Inhalation of volatile short-chain aromatic hydrocarbons (AHs) may have interfered with respiratory functions in harbor seals exposed to crude oil from the *Exxon Valdez* spill. It may have caused respiratory or cardiac arrest in some specimens. Concentrations of PAHs were near or below detection limits in most specimens, however. Harbor seals and other marine mammals probably metabolize hydrocarbons rapidly and efficiently. No definite evidence exists of contamination of tissues or toxicological effects on cetaceans examined after the *Exxon Valdez* spill (O'Hara and O'Shea 2001). Cases involving respiratory problems, cardiac arrest or serious health problems would be significant (Class II).

Polychlorinated biphenyls (PCBs): Although PCBs are present at measurable quantities in the shell mound sediments, PCBs are very widely distributed in the world's oceans as well, making it difficult to assess potential impacts from a specific location on far-ranging species. PCBs and other organochlorines are lipophilic — they are strongly attracted to fatty tissues. This is why PCBs reach the highest concentrations in the blubber of marine mammals (Borrell and Aguilar 1999; O'Hara and O'Shea 2001). PCBs have been found worldwide in numerous species of marine mammals.

Potential impacts of PCBs to marine mammals, based on experiments with laboratory animals, include liver, immune system and skin disorders. Congenital malformations, developmental neurotoxicity and carcinogenicity have also been suggested (Brouwer 1999). None of these effects have been positively attributed to marine mammals, thus caution must be exercised in assessing the potential of such impacts. Also, 209 PCB compounds exist; only one, Arochlor 1254, has been found in the shell mounds. The effects of this particular PCB on marine wildlife are not known. Given the current lack of quantitative, conclusive evidence linking increased levels of PCBs with marine mammal diseases, it is difficult to assess the effects that the PCB in the shell mounds (Arochlor 1254) may have on marine mammals. Given the uncertainty, potential impacts from PCBs at the Shell Mound sites should be considered potentially significant but mitigable (Class II).

Metals: A number of metals have been detected in the shell mounds and/or natural sediments. Four of these metals are known as essential metals; that is, they are essential to maintaining the health of an organism. These include copper, iron,

3.4 Marine Wildlife

selenium, and zinc (Bowles 1999). Others are nonessential. Both essential and nonessential metals can be toxic in organisms if present in sufficient quantities.

Metals are not concentrated in fatty tissue (Borrell and Aguilar 1999). Instead, they concentrate in the liver and kidney, and generally to a lesser extent, in muscle, skin and bone (O'Hara and O'Shea 2001). They usually increase with age, except for zinc, which is inconsistent between species. The only metal reported in the shell mounds that bioaccumulates is mercury (Aguilar et al. 1999; Bowles 1999) and it was found in very low concentrations. Organic mercury in the biota is transformed to methyl mercury, a derivative, which is readily transferable through the food web and is more toxic than other forms (Borrell and Aguilar 1999). The highest levels of mercury found in the shell mounds were mostly well below the levels found at the control sampling site (0.10 µg/g) except for one sample taken from the middle strata of the Hope Shell Mound, which was 0.145 µg/g (see Section 3.2.1.3). All of the samples were well below the USEPA Water Quality criteria for contaminants, however (see Table 3.2.6).

The following metals are present at one or more sites and are above accepted levels in at least one site: arsenic, cadmium, chromium, lead, nickel, and zinc (de Wit 2001; see Section 3.2.1.3 for details). None of these metals have been conclusively implicated in any marine mammal health problems on the west coast. Nonetheless, considering their potential toxicity, their presence should be considered Class II.

MITIGATION MEASURES FOR IMPACT MW-5

MMs WQ-2a-e, WQ-3a, and MB-2a would minimize potential impacts from contaminated materials and oil or fuel spills.

RESIDUAL IMPACTS

No residual negative impacts are anticipated from dredging activities. Removal of contaminated materials will represent a beneficial impact (Class IV).

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|---|--|--------------|
| PA1 | MW-6 | Dredging sounds can result in Level B harassment of marine mammals. | Santa Barbara County (shell mound sites) | II |

Impacts

DREDGING SOUNDS

A few studies have been conducted on sounds generated by dredging activities. In one study, suction cutter (cutterhead) dredges were used during the construction of an artificial island in the Beaufort Sea. At approximately 0.2 km, the dredges emitted sounds of approximately 133 dB and 141 dB re 1µPa. The quieter of the two dredges emitted sounds of approximately 120 dB re 1µPa at a range of 1.2 km, while the other dredge produced about 138 dB re 1µPa at the same range. In contrast, two hopper

dredges generated sounds of approximately 141 and 145 dB re 1 μ Pa at a range of nearly 0.5 km (Richardson et al. 1995).

In another study, recorded underwater sounds from a suction dredge were projected into the water to determine the response of bowhead whales to the noise. Whales exposed to sounds of 122 to 131 dB re 1 μ Pa stopped feeding and moved from within 0.8 km of the sound projector to over 2 km distant. The most pronounced reactions came when the dredging noises were 20 dB or more above ambient sounds, or when sounds in the most prominent 1/3-octave band were above 30 dB. In other areas, bowhead whales exposed to actual dredging sounds behaved normally, while others displayed avoidance behavior during playback of recorded sounds at similar levels. This could indicate that whales become habituated to steady dredging noises even though they may be startled at first. It could also indicate that more sensitive individuals left the area (Richardson et al. 1995). The authors point out that low frequency sounds (below 50 dB) were under-represented because of projector limitations. Whether this had an effect on the reactions of the whales was not discussed.

In another study, the sounds of a bucket dredge were recorded, yielding the most intense sounds in the 1/3-octave band at 250 Hz (hertz), which is a low frequency sound. Source levels ranged from 150 to 162 dB re 1 μ Pa within 1 meter of the source (Miles et al. 1986 and 1987). The loudest sounds were produced by winching the loaded bucket up to the surface. According to Dickerson et al. (2001), this could have indicated a poorly maintained or poorly lubricated dredge that was particularly noisy.

A study was recently completed on sound pressure levels generated by clamshell bucket dredging in Alaska (Dickerson et al. 2001). In this study, the dredges were well maintained and lubricated. Sounds of the loaded bucket being winched to the surface were very low compared to the sounds of the clamshell striking the sea floor. Dickerson et al. (2001) distinguished six separate sounds produced by bucket dredging:

1. Swinging the bucket into position and dropping it into the water.
2. The bucket striking the sea floor.
3. The bucket closing over sediment or gravel.
4. The jaws of the bucket snapping shut.
5. The loaded bucket being winched to the surface.
6. The load being dumped into a barge.

By far the loudest sounds were produced when the bucket struck the sea floor. These sounds measured 124.01 dB re 1 μ Pa-rms at a distance of 158 meters from the source. (Rms refers to root-mean-square and represents the average peak pressure over the duration of the sound.) Winching sounds at the same range were 116.57 dB re 1 μ Pa-rms. Barge loading sounds were 108.59 dB re 1 μ Pa-rms. The bucket digging sounds varied considerably, but were louder when gravel, as opposed to fine sediments, was excavated. The loudest digging sound was 120.17 dB re 1 μ Pa-rms at a range of 344 meters from the source. The loudest sounds generated by the bucket closing were

3.4 Marine Wildlife

109.12 dB re 1µPa-rms 652 meters from the source. In general, sounds tended to fall off gradually with distance (Dickerson et al. 2001).

The majority of sounds produced by dredging operations were relatively low frequency, from 20 to 1000 Hz. (Sounds below 20 Hz could not be recorded because of the limitations of the equipment.) Dickerson et al. (2001) point out that the turbid waters of Cook Inlet, where the data were recorded, may have scattered some of the sound energy. Also, the dredging was performed in 10 meters of water or less, so reflection may have cancelled some of the sound energy as well (our assumption).

Little or no data are available on the effects of dredging noise on pinnipeds, odontocetes or sea otters (Richardson et al. 1995). California sea lions and Pacific harbor seals did not appear to react to the sounds of dredging with a clamshell bucket during the Mobil Seacliff Pier Decommissioning project (Howorth 1998a).

In conclusion, noise produced by the operation of dredging equipment, providing the equipment is well-maintained and well-lubricated (see MM MW-6a), would not harm marine wildlife, and any behavioral effects are expected to be less than significant (Class III).

MITIGATION MEASURES FOR IMPACT MW-6

MW-6a *The environmental clamshell bucket dredge shall be well maintained and lubricated to further minimize dredging sounds.*

MM WQ-2a requires the use of an enclosed (environmental) bucket dredge, which will also help minimize impacts of dredging sounds on marine mammals.

RESIDUAL IMPACTS

Residual impacts would be less than significant.

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|---|---|--------------|
| PA1 | MW-7 | Transport, ocean disposal, smoothing of remaining shell mound materials, and testing for remaining contaminants pose risks of distributing toxic or bioaccumulative substances. | Offshore Santa Barbara County or en route to POLB | II |

Impacts

TRANSPORT AND DISPOSAL

Transport and disposal activities pose risks to marine wildlife that are similar to those of shell mounds removal. The same potential impacts discussed above, such as collision or release of toxic materials into the water column, would apply to the transportation and

1 removal of the shell mound materials. Disposal on land following transport to the Port of
2 Long Beach would have no impact on marine wildlife.

3 The unconfined disposal of all of the shell mounds materials in the open ocean (e.g., at
4 LA-2) would pose risks of toxicity and bioaccumulation to marine food webs, which
5 would be significant (Class II).

6 SMOOTHING, CLEAN-UP AND RESTORATION OF THE SEA FLOOR

7 Smoothing the remaining shell mound sediments would increase the exposure of
8 benthic organisms to remaining contaminants, but dilution of materials suspended in the
9 water column would minimize exposure of such contaminants to mid-water and pelagic
10 organisms. Furthermore, adverse bioaccumulation effects on marine wildlife would not
11 likely occur given the low occurrence of fish in the area, and therefore, the reduced
12 opportunity for such wildlife to consume large amounts of contaminated fish.
13 Considering this, no impacts to marine wildlife are anticipated from smoothing
14 operations.

15 The use of lifting gear and trawl nets to reconfigure the sea floor to its original contours
16 is not expected to have any impacts on marine mammals, sea turtles or seabirds.
17 Reconfiguring the sea floor is not expected to result in the incidental entanglement of
18 marine mammals, sea turtles (because they are not expected, as discussed herein, to
19 be at the project site) or seabirds because the trawl device makes noise as it moves, as
20 opposed to a gillnet, which is silent. Risks attendant with having vessels in the area,
21 such as collision and oil spills, would still remain, but considering the reduced number of
22 such vessels, these risks are not significant.

23 TESTING FOR REMAINING CONTAMINANTS

24 If appreciable shell mound materials remain that were not removed during final
25 smoothing, a potential would exist for acute toxicity and contaminant bioaccumulation.
26 This would be a significant but mitigable impact (Class II).

27 Testing for remaining contaminants after removal operations is not expected to have
28 any impacts on marine mammals, sea turtles or seabirds. Risks attendant with having
29 vessels in the area, such as collision and oil spills, would still remain, but considering
30 the reduced number of such vessels, these risks are not significant.

31 MITIGATION MEASURES FOR IMPACT MW-7

32 **MMs WQ-2a-d, MB-2a, MB-4a-b, MW-2a2, MW-2a12-a13, and MW-4a1-a3** would
33 apply to impacts associated with the transport and disposal of shell mound
34 materials.

35 **MM WQ-3a**, testing the shell mound sediments and removing contaminated
36 materials, would apply to remaining impacts associated with smoothing the shell
37 mounds.

3.4 Marine Wildlife

Measures that are part of the Marine Wildlife Protection Plan (MM MW-2a) would also apply to transport and disposal (see above for details).

RESIDUAL IMPACTS

A beneficial (Class IV) impact is anticipated with the removal of potentially toxic or bioaccumulative materials. A less than significant (Class III) impact would remain if appreciable shell mounds remain after smoothing. The residual impact of ocean disposal would be significant and unmitigable (Class I).

3.4.4.2 Program Alternative 2 (PA2): Leveling and Spreading of Shell Mounds with Caissons Removal and Disposal

This Program Alternative would involve the use of a standard clamshell dredge to spread the shell mound material over a 300 to 1,000 ft (91 to 305 m) radius around each site. This material would cover the natural sediments with a layer approximately 1 foot (0.3 m) thick. Shell mound debris would be removed, and site smoothing would be accomplished with a "gorilla net." The four caissons at the Platform Hazel site would be demolished and removed as well.

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|--|-------------------------------|--------------|
| PA2 | MW-8 | Leveling and spreading the shell mound materials, then leaving them in place poses risks of toxic substances bioaccumulating in the marine food web, adding to the burden of such materials already in the marine environment. | Offshore Santa Barbara County | I |

Impacts

Impacts associated with the removal, transport and disposal of the Hazel caissons, discussed in Section 3.4.4.1 above, would occur. Vessel activities associated with leveling and spreading the shell mounds pose some risk of harm or harassment to marine wildlife. Such impacts and appropriate mitigation measures are also discussed in Section 3.4.4.1.

Long-term impacts associated with the leveling and spreading of the shell mounds involve the continued presence of toxic substances that can bioaccumulate in the marine food web and add to the burden of such material already in the ocean. Marine wildlife, feeding on organisms lower in the food chain that have ingested toxins in the shell mounds, could be impacted. However, the likelihood of wildlife being significantly impacted from this effect is minimal because they would be unlikely to consume a large enough quantity of such prey species to be adversely affected. For significant impacts to occur, such wildlife would also have to consume prey tainted with toxins from other sources as well.

MITIGATION MEASURES FOR IMPACT MW-8

None proposed.

RESIDUAL IMPACTS

Spreading and leveling the shell mound sediments would increase the potential for toxic and bioaccumulative materials to enter the marine food web and add to the burden of such materials already in the ocean; this would remain a Class I impact.

3.4.4.3 Program Alternative 3 (PA3): Capping

This Program Alternative involves depositing clean sediments to cap one or more of the shell mounds. Large volumes of clean sediments of a compatible grain size would be used. Additional material would be deposited around the base of the mounds to reduce the slope so that trawl nets could slide over the mounds. This Program Alternative would require a formal designation by the USEPA to make the shell mounds ocean disposal sites under the MPRSA.

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|--|---|--------------|
| PA3 | MW-9 | If the cap were damaged, a release of potentially toxic or bioaccumulative substances could occur. | Offshore Santa Barbara County (shell mound sites) | II |

Impacts

Vessel activities associated with capping the shell mounds pose some risk of harm or harassment to marine wildlife. These risks are discussed in Section 3.4.4.1. If the capping materials were deposited too rapidly, the shell mound sediments could be disturbed, releasing potentially toxic or bioaccumulative substance into the water column. The use of a down-pipe to control the rate of deposition, discussed in Section 3.2.4.3, would minimize such impacts, however. If the cap eroded or were damaged by fishing gear, anchoring or natural causes, a release of potentially toxic or bioaccumulative substances could occur. Potential impacts and relevant mitigation measures associated with vessel activities and the dispersal of potentially toxic or bioaccumulative substances into the water column are discussed in Section 3.4.4.1. An ongoing monitoring program, as discussed in Section 3.2.4.3, could be conducted to ensure that the caps remained effective and that no material was being released into the water column, reducing this impact to less than significant (Class III).

MITIGATION MEASURES FOR IMPACT MW-9

MMs MW-2a2, MW 2a12-a13, MW-4a1-a3, WQ-7a and WQ-8a and WQ-9a would apply to this impact.

RESIDUAL IMPACTS

No residual impacts on marine wildlife are anticipated.

3.4.4.4 Program Alternative 4 (PA4): Artificial Reefs at all Four Shell Mounds

This Program Alternative involves leaving the shell mounds in place, but adding quarry rock around the base, providing hard bottom habitat and protecting against disturbances to the mounds.

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|--|---|--------------|
| PA4 | MW-10 | Placing quarry rock on the shell mound sediments would not completely protect the shell mound sediments from disturbance, which could result in the release of potentially toxic material into the water column. | Offshore Santa Barbara County (shell mound sites) | II |

Impacts

Vessel activities associated with creation of the artificial reefs pose some risk of harm or harassment to marine wildlife. These include impacts from collision, temporary mooring buoys, wastes, fishing activities, and anchoring. Such impacts are discussed in Section 3.4.4.1.

Assuming that a clamshell bucket were used to lower quarry rock, concrete or other material to the shell mounds, the noise impact and mitigation measure discussed in Section 3.4.4.1 under Dredging Sounds would apply, except that an environmental clamshell bucket would not be required since the material to be handled would not be contaminated. The quarry rock could be lowered at a controlled rate all the way to the sea floor before being released, resulting in less disturbance of seafloor sediments.

Considering the abundance and diversity of marine wildlife in the region and the size of the artificial reefs, the addition of the hard bottom benthic habitat would have very little value in enhancing prey resources for marine wildlife, particularly considering the potential for release of toxic materials.

Although circling the shell mounds with quarry rock would lessen the chances of disturbance from anchoring and trawling activities, the contaminated sediments and associated risks (discussed in Section 3.4.4.2) would remain. The shell mounds could be monitored to ensure that no contaminants were being released into the water column, however.

MITIGATION MEASURES FOR IMPACT MW-10

MMs MW-2a2, MW 2a12-a13, MW-4a1-a3, WQ-3a, and WQ-11a would apply to this impact.

RESIDUAL IMPACTS

Leaving contaminated sediments in place poses the continued risk of toxic substances entering the marine food web. Although such an impact would be significant (Class II), MM WQ-11a (Section 3.2.4.4) would allow for the detection and repair of damage to the mounds that would indicate the possibility of contaminant releases.

3.4.4.5 Program Alternative 5 (PA5): Artificial Reef at Hazel after Removing (5a) or Spreading (5b) Shell Mounds

With this Program Alternative, the Hazel caissons would be left in place to serve as cornerstones for an artificial reef. The space between the caissons would be filled with quarry rock, resulting in the creation of a reef measuring approximately one acre. Other materials could be used to enhance the reef and provide higher relief and more habitat.

Impacts

This Program Alternative comprises two parts, both of which involve leaving the Hazel caissons in place and enhancing them with artificial reef materials. Considering the abundance and diversity of marine wildlife in the region and the size of the artificial reef at the Platform Hazel site, this Program Alternative would enhance prey resources only for very small numbers of local marine wildlife and would not provide a significant increase in habitat.

Program Alternative 5a (PA5a): Artificial Reef at Hazel Site plus Removal and Disposal of Shell Mounds

This Program Alternative calls for the removal of all shell mound sediments, so all of the impacts and mitigation measures discussed in Section 3.4.4.1 would apply except those concerning the use of explosives or mechanical devices to demolish the caissons. Assuming that a clamshell bucket were used to lower quarry rock, concrete or other material to the Platform Hazel site, the same impacts and mitigation measures discussed under Dredging Sounds in Section 3.4.4.1 would apply, except that an environmental clamshell bucket would not be required since the material to be handled would not be contaminated.

Program Alternative 5b (PA5b): Artificial Reef at Hazel Site plus Leveling and Spreading Shell Mounds

This Program Alternative involves leveling and spreading the shell mound sediments instead of removing them. All of the impacts discussed in Section 3.4.4.2 would apply to this part. No mitigation measures are feasible for leveling and spreading the shell mound sediments because of the potential for toxic and bioaccumulative materials entering the marine food web and adding to the burden of such materials already in the ocean. This impact would be significant and unmitigable (Class I).

3.4.4.6 Program Alternative 6 (PA6): Offsite Mitigation

Under this Program Alternative, the shell mounds would be left in place and not altered or protected from disturbance. Two offsite mitigation measures to enhance benthic resources are discussed in Section 3.3.4.6. Several offsite commercial and recreational fisheries enhancement measures are described in Section 3.5.4.6. None of these measures will enhance marine wildlife resources.

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Impact Description</i> | <i>Region/Location</i> | <i>Class</i> |
|----------------------------|-----------------|--|---|--------------|
| PA6 | MW-11 | Leaving the shell mounds in place would result in risks of contaminants being released, with potential toxic and bioaccumulative effects to marine wildlife. | Santa Barbara County (shell mounds sites) | II |

Impacts

As discussed in PA2 and PA4, leaving the shell mound sediments in place necessitates mitigation, even though evidence indicates that the contaminated sediments are not being released into the water column, nor are they apparently causing adverse toxic or bioaccumulative impacts. Nonetheless, the release of toxic substances could occur from trawling operations, anchoring, burrowing animals, earthquakes, or seafloor scouring during periods of unusually high swells or strong currents. Although such an impact would be significant (Class II), MM WQ-8a (Section 3.2.4.6) would allow for the detection and repair of damage to the mounds that would indicate the possibility of contaminant releases.

MITIGATION MEASURES FOR IMPACT MW-11

MM WQ-11a would apply to this impact.

RESIDUAL IMPACTS

Leaving the shell mounds in place poses the risk of toxic and bioaccumulative substances entering the marine food web should the integrity of the shell mounds be compromised. MM WQ-11a would reduce this impact to less than significant, however (Class III).

3.4.4.7 No Project Alternative

Under the No Project Alternative, the shell mounds would be left in place and no on- or offsite mitigation measures would be implemented. As such, there would be a continuation of the following impacts as discussed in previous sections:

1. Permanent loss of four acres of natural seafloor habitat.
2. Ongoing risk of contaminant releases from the shell mounds if the mounds are damaged.

Table 3.4-8. Summary Matrix of Potential Impacts to Marine Wildlife Associated with Program Alternatives

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Potential Impact</i> | <i>Impact Class</i> | <i>Mitigation Measures</i> |
|----------------------------|-----------------|--|---------------------|--|
| PA1 | MW-1 | Permanent removal of contaminated sediments. | IV | <i>None proposed.</i> |
| | MW-2 | Mortality, injury, permanent (hearing) threshold shift, temporary threshold shift, and/or harassment from explosives | II | <p><i>MM MW-2a. Preparation of Marine Wildlife Protection Plan, including key contacts, vessels and equipment, contractors, schedules, procedures and acoustic deterrence options.</i></p> <p><i>MM MW-2a1. Independent, third party monitors approved by NOAA Fisheries and CDFG.</i></p> <p><i>MM MW-2a2. Notice to agencies and wildlife rescue organizations: briefing of key personnel.</i></p> <p><i>MM MW-2a3. Multiple, reliable communications.</i></p> <p><i>MM MW-2a4. Aerial and vessel line transect surveys. Tagging of dead floating wildlife; determination of cause if possible.</i></p> <p><i>Moving animals from hazard zone if authorized.</i></p> <p><i>MM MW-2a5. Harassment authorization to coax animals out of hazard zone.</i></p> <p><i>MM MW-2a6. Establishing and maintaining 1000-meter hazard zone; adjusted if warranted.</i></p> <p><i>MM MW-2a7. Use of visual signals if radio silence imposed. Detonation of as many charges as possible in staggered sequence no later than one hour before sunset.</i></p> |

Table 3.4-8. Summary Matrix of Potential Impacts to Marine Wildlife Associated with Program Alternatives (continued)

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Potential Impact</i> | <i>Impact Class</i> | <i>Mitigation Measures</i> |
|----------------------------|-----------------|--|---------------------|--|
| | | | | <p><i>MM MW-2a8. Use of minimal amount of explosives. Stemming of charges. Use of berm around detonation sites.</i></p> <p><i>MM MW-2a9. Measurement of sound pressure levels and adjustment of hazard zone if indicated.</i></p> <p><i>MM MW-2a10. Recording data to assess effectiveness of mitigation.</i></p> <p><i>MM MW-2a11. Surveying after detonation.</i></p> <p><i>MM MW-2a12. Notification of rescue centers if any wildlife injured. Report submitted within 24 hours.</i></p> <p><i>MM MW-2a13. Final mitigation monitoring report.</i></p> <p><i>MM MB-6a would also apply.</i></p> |
| | MW-3 | Use of mechanical cutting would result in personnel safety concerns, use of explosives anyway, and prolonged presence on site. | II | <i>MMs MW-2a1-a13, MW-4a1-a3, and MW-6a would apply.</i> |
| | MW-4 | Increased vessel traffic, mooring buoys, waste discharge, unauthorized fishing, and anchoring can result in mortality, injury of harassment. | II | <p><i>MM MW-4a. Adoption of operational procedures to minimize collision impacts.</i></p> <p><i>MM MW-4a1. Guidelines for vessel maneuvering when marine mammals are present.</i></p> <p><i>MM MW-4a2. Use of small spherical mooring buoys to preclude sea lions hauling out in hazard zone.</i></p> <p><i>MM MW-4a3. No discharge of food wastes or fishing activities.</i></p> <p><i>MB-2a would also apply.</i></p> |

Table 3.4-8. Summary Matrix of Potential Impacts to Marine Wildlife Associated with Program Alternatives (continued)

| <i>Program Alternative</i> | <i>Impact #</i> | <i>Potential Impact</i> | <i>Impact Class</i> | <i>Mitigation Measures</i> |
|----------------------------|---|--|---------------------|--|
| | MW-5 | Dredging activities resulting in release of bioaccumulative or toxic substances. | II | <i>MMs WQ-2a-e, WQ-3a and MB-2a would apply.</i> |
| | MW-6 | Dredging sounds causing Level B harassment of marine mammals. | II | <i>MM MW-6a. Use of well-maintained and lubricated clamshell bucket. MM WQ-2a would also apply.</i> |
| | MW-7 | Transport, ocean disposal, smoothing of shell mounds, and testing resulting in release of bioaccumulative or toxic substances. | II | <i>MMs WQ-2a-d, WQ-3a, MB-2a, MB-4a-b, MW-2a2, MW-2a12-a13, and MW-4a1-a3 would apply.</i> |
| PA2 | MW-8 | Leveling, spreading and leaving materials in place resulting in bioaccumulation or toxic impacts. | I | <i>None proposed.</i> |
| PA3 | MW-9 | If cap damaged, release of bioaccumulative or toxic substances possible. | II | <i>MMs MW-2a2, MW-2a12-a13, MW-4a1-a3, WQ-7a, WQ-8a, and WQ-9a would apply.</i> |
| PA4 | MW-10 | Quarry rock would not completely prevent release of bioaccumulative or toxic substances. | II | <i>MMs MW-2a2, MW-2a12-a13, MW-4a1-a3, WQ-3a, and WQ-11a would apply.</i> |
| PA5a/b | MW-1, and MW-4 through MW-7 for PA5a; MW-8 for PA5b | Same as for PA1 and PA2 | I-II | <i>MMs MW-4a1-a3, MW-6a, WQ-2a-e, WQ-3a, MB-2a, MW-2a2, MW-2a12-a13, MB-4a-b would apply to PA5a; no measures are feasible for PA5b.</i> |
| PA6 | MW-11 | Ongoing risks of release of bioaccumulative or toxic substances. | II | <i>MM WQ-11a would apply.</i> |